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## Duplex And Compressibility Ultrasound Examination In Canine Thoracic Limb

### Citation for published version:

Lodzinska, J, Leigh, H, Parys, M & Liuti, T 2019, 'Duplex And Compressibility Ultrasound Examination In Canine Thoracic Limb', Paper presented at BSAVA congress 2019, 4/04/19 - 7/04/19 pp. 487.

### Link:

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# BSAVA Congress 2019

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# Proceedings

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Published by:

**British Small Animal Veterinary Association**

Woodrow House, 1 Telford Way,  
Waterwells Business Park, Quedgeley,  
Gloucester GL2 2AB

A Company Limited by Guarantee in England and Wales.

Registered Company No. 02837793.

Registered as a Charity No. 1024811

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Print edition 978-1-910443-68-2

Digital edition 978-1-910443-69-9

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BRITISH SMALL ANIMAL VETERINARY ASSOCIATION



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# Acknowledgements

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Production of the proceedings takes considerable effort. I am grateful to the authors for producing their abstracts and to members of the Congress Programme Committee for reviewing every abstract along with the staff of BSAVA for their hard work in ensuring this book was published in time for BSAVA Congress 2019

## SUSAN MURPHY

Chair of Congress Programme Committee 2019







Section I

















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# Programme

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# Programme · Thursday 4 April












Hall 1	Hall 3	Hall 4	Hall 5	Hall 6	Hall 7	Hall 8
MY TOP TIPS IN...	OBESITY 	SURGICAL COMPLICATIONS	ONCOLOGY	RCVS 	EXOTICS BSAVA Manual of Reptiles, 3rd edition	DERMATOPHYTOSIS
<b>08:30–09:15</b> Neurology Rick LeCouteur (USA)	<b>08:30–09:15</b> The principles of weight management: using scientific evidence to maximise success Alex German (UK)	<b>08:30–09:15</b> My wound broke down: what now? Mickey Tivers (UK)	<b>08:30–09:15</b> Paraneoplastic syndromes Erik Teske (NL)	<b>08:30–08:50</b> Graduate outcomes review: looking to the future Stephen May (UK)  <b>08:55–09:15</b> Leadership for all with the Edward Jenner Leadership Programme Amanda Boag (UK)	<b>08:30–09:15</b> Updates on rabbit medicine & surgery Chris Mans (USA)	<b>08:30–09:15</b> Dermatophytosis casebook: common impersonators and atypical presentations Susan Paterson (UK)
<b>09:25–10:10</b> Oncology Gerry Polton (UK)	<b>09:25–10:10</b> The practicalities of weight management: making it work in your practice Georgia Woods (UK)	<b>09:25–10:10</b> My enterotomy is leaking: what now? Mickey Tivers (UK)	<b>09:25–10:10</b> Biopsies: getting good results Jon Bray (UK)	<b>09:25–10:10</b> RCVS Mind Matters Initiative: disclosure	<b>09:25–10:10</b> Sedation, analgesia and anaesthesia in small mammals Chris Mans (USA)	<b>09:25–10:10</b> Is it a false positive? Current recommendations for diagnosis of dermatophytosis Susan Paterson (UK)
Morning Tea & Coffee Break						
<b>11:05–11:50</b> Reproduction Gary England (UK)	<b>11:05–11:50</b> Tackling the obese patient with concurrent disease: what are your priorities? Alex German (UK)	<b>11:05–11:50</b> Having difficult conversations Christine Magrath (UK) 	<b>11:05–11:50</b> Pathology reports: what a clinician needs to know Erik Teske (NL)	<b>11:05–11:50</b> RCVS Mind Matters Initiative: 6me live part I	<b>11:05–11:50</b> Managing chelonian shell disorders Chris Mans (USA)	<b>11:05–11:50</b> Managing multiples: dermatophytosis disease outbreaks Susan Paterson (UK)
<b>12:00–12:45</b> Soft tissue surgery Mickey Tivers (UK) 	<b>12:00–12:45</b> Can obesity be prevented? Alex German (UK)	<b>12:00–12:45</b> Something is bleeding: what now? Rachel Hattersley (UK)	<b>12:00–12:45</b> Is advanced imaging always better? Gerry Polton (UK)	<b>12:00–12:45</b> RCVS Mind Matters Initiative: 6me live part II	<b>12:00–12:45</b> Avian clinical techniques Chris Mans (USA)	<b>DEALING WITH MDR STAPHYLOCOCCAL INFECTIONS</b>  <b>12:00–12:45</b> The lab report says MRSP: what do I need to know? Anette Loeffler (UK)
REPRODUCTION		Lunch in Arena Birmingham			13:15 Upper deck, BSAVA Stand Encouraging a rational approach to the use of antibiotics in small animal practice Fergus Allerton	
<b>14:05–14:50</b> Cardiology Ruth Willis (UK) 	<b>14:05–14:50</b> Hormonal testing Gary England (UK)	<b>14:05–14:50</b> I didn't get surgical margins: what now? Mickey Tivers (UK)	<b>14:05–14:50</b> Planning oncological surgery Jon Bray (UK)	<b>14:05–14:50</b> VN Futures: a VN's guide to wellbeing Laura Black (UK)	<b>14:05–14:50</b> Clinical applications of rabbit endoscopy Paolo Selleri (IT)	<b>14:05–14:50</b> Tough choices: treatment options for MRSP pyoderma Anette Loeffler (UK)
<b>15:00–15:45</b> Orthopaedic surgery Duncan Barnes (UK)	<b>15:00–15:45</b> Managing the pregnant bitch Angelika von Heimendahl (UK)	<b>15:00–15:45</b> I left a urolith behind: what now? Rachel Hattersley (UK)	<b>15:00–15:45</b> Chemotherapy: the basics Erik Teske (NL)	<b>15:00–15:45</b> VN Futures: a VN's guide to the Practice Standards Scheme Liz Cox (UK)	<b>15:00–15:45</b> Clinical applications of reptile endoscopy Paolo Selleri (IT)	<b>15:00–15:45</b> Top hygiene tips for dealing with multi-drug resistant skin pathogens in practice Anette Loeffler (UK)
Afternoon Tea & Coffee Break						
President's Welcome, BSAVA Awards and Keynote Lecture with MATTHEW SYED  Hall 1 16:00–17:30	<b>15:50–16:35</b> Managing parturition: when do I reach for the scalpel? Angelika von Heimendahl (UK)	 Hall 1 16:00–17:30	<b>15:50–16:35</b> Oncology treatments: new and on the horizon Gerry Polton (UK)	<b>15:50–16:35</b> VN Futures: a VN's guide to Schedule 3 and Delegation Julie Dugmore (UK)	<b>15:50–16:35</b> Top tips for ferret surgery Paolo Selleri (IT)	<b>MATTHEW SYED</b> Hall 1 16:00–17:30 Join one of the world's most influential thinkers in the field of high performance and cultural change. Matthew Syed, as he discusses how to build a mindset of continuous improvement in the context of a complex and fast-changing world.
	<b>16:40–17:25</b> First 48 hours Sylvia Chastant (FR)			<b>16:40–17:25</b> VN Futures: a VN's guide to Advanced Practitioner Status Susan Howarth (UK)	<b>16:40–17:25</b> Reptile diagnostic imaging Paolo Selleri (IT)	
17:00–19:00 Drinks in the Exhibition						








Education Zone, Arena	Hyatt Ballroom	Hall 9	Hall 10	Hall 11	Kingston Theatre	Vista Room, Arena	Venues as listed
EXHIBITOR STREAM	NEW TO BUSINESS LEADERSHIP ●●●spvs	OPHTHALMOLOGY	CONSULTATIONS	GENERAL NURSING		ZOETIS LEARNING ACADEMY	OTHER CPD
	08:30–09:15 Leadership: the art of managing uncertainty in veterinary practice Brian Faulkner (UK)	08:15–09:00 Common eye conditions: medical and surgical Charlotte Dawson (UK)	08:15–09:00 Surgical nursing clinics Nicola Ackerman (UK)	08:15–09:00 Mentoring and supporting students Andrea Jeffery (UK) Paula Hotston Moore (UK)	 <b>Thursday 4 April Hall 5, ICC 20:00</b> Join us for a relaxed showing of <b>MAMMA MIA!</b> on Thursday evening.	07:00–08:00 Yoga for all	08:00–09:00 Executive 1, ICC SMALL GROUP SESSION – VET Breakfast with a specialist Gary England (UK)
10:10–10:55 Metronomic chemotherapy in veterinary oncology Sofia Carvalho 	09:25–10:10 Acquiring the 'right' to lead: the difference between knowledge and self-belief Brian Faulkner (UK)	09:10–09:55 Surgical preparation and instrumentation for ophthalmic patients Charlotte Dawson (UK)	09:10–09:55 Nurse clinics: should we be charging? Nicola Ackerman (UK)	09:10–09:55 Infection control: a challenge for the whole team Louise O'Dwyer (UK)		12:45–13:10 Do we really need to worry about ticks? Ian Wright	09:00–11:00 Repeated at 12:00–14:00 and 15:00–17:00 Birmingham Medical School* WETLAB Dental radiography Peter Haseler (UK) 
11:05–11:50 Sutures Julian Hoad 	<b>Morning Tea &amp; Coffee Break</b>					13:20–13:45 Tick-borne diseases in cats Stephanie Sorrell	09:00–11:00 Repeated at 12:00–14:00 and 15:00–17:00 Birmingham Medical School* WETLAB
12:00–12:45 Blurred lines: lung patterns made simpler Tim Trevail 	11:05–11:50 Leadership and culture: two sides of the same coin Brian Faulkner (UK)	10:50–11:35 Post-op nursing considerations for ophthalmic patients Charlotte Dawson (UK)	10:50–11:35 How to implement running a clinic Helen Tottey (UK)	10:50–11:35 Lungworm: should we be worried? Emily Thomas (UK)	11:05–11:50 Extra-mural studies: how do we balance student experience and staff workload? David Charles (UK) 	13:50–14:15 Fleas: clear and hidden dangers Sarah Warren and Ian Wright	09:00–11:00 Repeated at 12:00–14:00 and 15:00–17:00 Birmingham Medical School* WETLAB Rabbit dentistry John Robinson (UK) 
13:00–13:45 Osteoarthritis: facing the challenge of chronic pain using integrated treatments Mathilde Granger 	12:00–12:45 Leading your sub-team managers Brian Faulkner (UK)	<b>NEUROLOGY</b>	11:45–12:30 How to do more clinics Helen Tottey (UK)	11:45–12:30 Where have all the nurses gone and why are they leaving? Andrea Jeffery (UK)		14:35–15:00 The 'Wright parasite' interactive game show Ian Wright	09:00–12:00 Repeated at 14:00–17:00 Birmingham Medical School* WETLAB Basic eye surgery Ben Blacklock (UK) Elena Fenollosa-Romero (UK) 
		11:45–12:30 Nursing the brain injury patient Holly Smith (UK)				15:05–15:30 How Zoetis grows your parasitic business: the win-win of good medicine and good business Hugh McConville and Sophie Duguid	15:45–16:10 The approach to the pruritic dog in a 10-minute consultation Sarah Warren
14:00–14:45 Spotlight on LivingArt: My career as a veterinary illustrator Samantha Elmhurst 	14:05–14:50 Setting up from scratch Brian Faulkner (UK)	13:50–14:35 Nursing and rehabilitating patients with neuromuscular disease Joe Fenn (UK)	13:50–14:35 Communication skills for consulting nurses Helen Tottey (UK)	13:50–14:35 Nursing and treatment options for the hyperthyroid cat Suzanne Rudd (UK)	14:00–15:00 Award ceremony	16:15–16:40 21st century dermatology: which should I prescribe, a JAK or a MAB? Stan Baker	14:00–17:00 Executive 1, ICC SMALL GROUP SESSION – VET Emergency thoracic and abdominal radiology Raquel Salguero (SP) Jennifer Kinns (UK)
15:00–15:45 Management and use of wound drains and catheters Sam Bell 	15:00–15:45 So you're now a Clinical Director. Help! Brian Faulkner (UK)	14:45–15:30 Rehabilitation post spinal surgery Holly Smith (UK)	14:45–15:30 Medical clinics: what can we be doing? Nicola Ackerman (UK)	14:45–15:30 Ill communication: effective team handovers Louise O'Dwyer (UK)	15:00–17:00 Case studies Clinical Research Abstract: BSAVA Masters in Clinical Veterinary Research Project. Can telemetric surface electromyography be used to measure post-operative recovery of the quadriceps muscle group following surgery for cranial cruciate ligament rupture? Helen Torrington (UK)	17:00–17:45 Capnography, ventilators and IPPV: breathing for our patients Cathy Woodlands 	*Transport provided
16:00–16:45 Canine nutrition trends: facts, fads and fiction Sean McCormack 	<b>Afternoon Tea &amp; Coffee Break</b>						<b>CLINICAL ABSTRACTS Austin Court BOULTON ROOM</b> 08:30–10:15 Nephrology/urology 11:05–12:50 Hepatology/gastroenterology 14:05–15:35 Endocrinology <b>TELFORD ROOM</b> 08:30–10:15 Canine general practice 13:35–14:20 Diagnostic imaging 14:35–15:35 Nutrition and obesity
17:00–17:45 Capnography, ventilators and IPPV: breathing for our patients Cathy Woodlands 					Inspiring research Johanna Forsyth (UK)		
					Inspiring mentorship Hilary O'Dair (UK)		
					Inspiring advanced practitioner careers Aoife O'Sullivan (UK)		

17:00–19:00 Drinks in the Exhibition



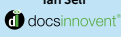
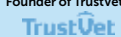



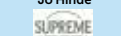


# Programme · Friday 5 April

Hall 1	Hall 3	Hall 4	Hall 5	Hall 6	Hall 7	Hall 8
<b>OPHTHALMOLOGY</b> 	<b>CLINICAL PATHOLOGY ON A BUDGET</b>	<b>HAEMATOLOGY</b>	<b>DENTISTRY</b> in association with BVDA 	<b>STUDENT STREAM</b> 	<b>PR AND MARKETING</b>	<b>BOURGELAT (STATE OF THE ART)</b>
<b>08:30–10:10</b> The cracked or dirty windshield: disorders of the ocular surface <b>Caryn Plummer (USA)</b>	<b>08:30–09:15</b> Getting more for no more from your laboratory <b>Ian Ramsey (UK)</b> 	<b>08:30–09:15</b> Approach to anaemia <b>Vicki Black (UK)</b>	<b>08:30–09:15</b> Odontogenic tumours <b>Philippe Hennet (FR)</b>	<b>08:30–08:50</b> The 10 minute consult: dealing with problem ears <b>Sophie Tyler (UK)</b> <b>08:55–09:15</b> The 10 minute consult: itchy and scratchy – approach to the pruritic dog in 10 minutes <b>Sophie Tyler (UK)</b>	<b>08:30–10:10</b> Effective consultation: how to make clients your best marketing tool <b>Discussion panel</b> <b>John Chitty (UK)</b> <b>Anne McBride (UK)</b> <b>Christine Magrath (UK)</b> <b>Ian Holloway (UK)</b>	<b>08:30–09:15</b> Imaging the adrenals <b>Raquel Salguero (SP)</b>
	<b>09:25–10:10</b> Cytology: fine-needle aspirate techniques and solid lumps <b>Kathleen Tennant (UK)</b> 	<b>09:25–10:10</b> Transfusion medicine <b>Dan Lewis (UK)</b>	<b>09:25–10:10</b> Jaw opening and closing disorders <b>Philippe Hennet (FR)</b>	<b>09:25–09:45</b> The 10 minute consult: my dog is drinking buckets! – PU/PD <b>Jen Stallwood (UK)</b> <b>09:50–10:10</b> The 10 minute consult: skinny kitties <b>Fiona Whitworth (UK)</b>		<b>09:25–10:10</b> Atypical hypoadrenocorticism: is it always straightforward? <b>Michael Herrtage (UK)</b>
<b>Morning Tea &amp; Coffee Break</b>					<b>BIG ISSUES</b>	
<b>11:05–11:50</b> The “bulging eye”: how do I know, how do I treat? <b>Ron Ofri (IL)</b>	<b>11:05–11:50</b> Cytology: don’t forget the blood smear <b>Kathleen Tennant (UK)</b> 	<b>11:05–11:50</b> Management of IMHA <b>James Swann (UK)</b>	<b>11:05–11:50</b> Flap techniques in palatal surgery <b>Philippe Hennet (FR)</b>	<b>11:05–11:50</b> Images: what can you see? <b>Vicki Black (UK)</b> 	<b>11:05–12:45</b> ABC: achievements, Brexit and challenges <b>Professor the Lord Trees (UK)</b> <b>Chris Laurence (UK)</b> <b>Sheila Voas (UK)</b> <b>Christianne Glossop (UK)</b>	<b>11:05–11:50</b> Diagnosis of canine hyperadrenocorticism: is it always straightforward? <b>Michael Herrtage (UK)</b>
<b>12:00–12:45</b> Glaucoma: understanding and treating a leading, and painful cause of blindness <b>Ron Ofri (IL)</b>	<b>12:00–12:45</b> Cytology: fluids <b>Kathleen Tennant (UK)</b> 	<b>12:00–12:45</b> Approach to the suspected coagulopathic patient <b>Vicki Black (UK)</b>	<b>12:00–12:45</b> Mandibular fracture repair considerations <b>Alexander Smithson (UK)</b>	<b>12:00–12:45</b> Emergency cases <b>Sophie Adamantos (UK)</b> 		<b>12:00–12:45</b> Monitoring treatment in canine hyperadrenocorticism <b>Ian Ramsey (UK)</b>
<b>Lunch in Arena Birmingham</b>				<b>RECENT GRADUATES</b>		<b>AVP</b>
<b>14:05–14:50</b> Ophthalmic manifestations of endocrinopathies <b>Caryn Plummer (USA)</b>	<b>14:05–14:50</b> When to test and when to treat <b>Ian Ramsey (UK)</b> 	<b>14:05–14:50</b> Management of thrombocytopenia <b>James Swann (UK)</b>	<b>14:05–14:50</b> Oral masses in cats: inflammatory or neoplastic <b>Philippe Hennet (FR)</b>	<b>14:05–14:50</b> Tooth extraction <b>Alexander Smithson (UK)</b>	<b>14:05–14:50</b> Medicines: ensuring supply despite crises <b>Peter Borriello (UK)</b> <b>Dawn Howard (UK)</b>	<b>14:05–14:50</b> Management of intraoperative hypotension <b>Delphine Holopherme-Doran (UK)</b>
<b>15:00–15:45</b> Masquerading eye disease: when one disease looks like another <b>Caryn Plummer (USA)</b>	<b>15:00–15:45</b> Point-of-care meters <b>Ian Ramsey (UK)</b> 	<b>15:00–15:45</b> Investigation of polycythaemia <b>Erik Teske (UK)</b>	<b>15:00–15:45</b> Feline chronic stomatitis: a frustrating and debilitating disease <b>Philippe Hennet (FR)</b>	<b>15:00–15:45</b> Pale, bruised, bleeding: what’s going on? <b>Dan Batchelor (UK)</b>	<b>15:00–15:45</b> The perils of passports and certification: avoiding litigation <b>Philip Lhermette (UK)</b> <b>Mauricio López (UK)</b> <b>Michael Stanford (UK)</b>	<b>15:00–15:45</b> Infection control for the surgical patient <b>Kelly Bowlt Blacklock (UK)</b>
	<b>CLINICAL PATHOLOGY REFRESHER</b>	<b>Afternoon Tea &amp; Coffee Break</b>				
<b>16:50–17:35</b> Cataract: what can I do about it? <b>Ron Ofri (IL)</b>	<b>16:50–17:35</b> Small mammals <b>John Chitty (UK)</b>	<b>16:50–17:35</b> Investigation of leucopenia <b>Erik Teske (UK)</b>	<b>16:50–17:35</b> Periodontal therapy <b>Alexander Smithson (UK)</b>	<b>16:50–17:35</b> Is this murmur significant? <b>Ruth Willis (UK)</b>	<b>16:50–18:30</b> Telemedicine: patient care in the digital world <b>Kate Richards (UK)</b> <b>Thom Jenkins (UK)</b> <b>Richard Guest (UK)</b> <b>Simon Doherty (UK)</b>	<b>16:50–17:35</b> Top tips for great medical and surgical case reports <b>Rachel Hattersley (UK)</b> <b>Ian Ramsey (UK)</b>
<b>17:45–18:30</b> Will my dog see again? Examination, assessment and differential diagnosis of the blind patient <b>Ron Ofri (IL)</b>	<b>17:45–18:30</b> Reptiles and birds <b>John Chitty (UK)</b>	<b>17:45–18:30</b> Haemolytic anaemia: when is it not IMHA? <b>Vicki Black (UK)</b>	<b>17:45–18:30</b> Feline extraction techniques <b>Alexander Smithson (UK)</b>	<b>17:45–18:30</b> How to manage cases that aren’t going well <b>Dan Batchelor (UK)</b>		<b>17:45–18:30</b> Options for the treatment of combined cranial cruciate ligament insufficiency and medial patellar luxation <b>Duncan Barnes (UK)</b>
<b>17:00–18:30 Drinks in the Exhibition</b>						



Education Zone, Arena	Hyatt Ballroom	Kingston Theatre	Hall 9	Hall 10	Hall 11	Vista Room, Arena	Venues as listed
CT STREAM	NEW TO MANAGEMENT	RCVS KNOWLEDGE	ECC	SURGICAL	BEHAVIOUR, WELFARE & ETHICS	ZOETIS LEARNING ACADEMY	OTHER CPD
<b>09:00–09:45</b> I want a CT scanner: considerations prior to purchase <b>Chris Warren-Smith (UK)</b> 	<b>08:30–09:15</b> Internal marketing <b>Stacey Davidson (UK)</b>	<b>08:30–09:00</b> How good are you and can you prove it? <b>Chris Gush (UK)</b>  <b>09:10–10:10</b> How to apply best evidence to manage and care for epilepsy patients in daily clinical practice <b>Holger Volk (UK)</b> <b>Paul Pollard (UK)</b>	<b>08:15–09:00</b> Nursing the trauma patient <b>Louise O'Dwyer (UK)</b>  <b>09:10–09:55</b> Nutrition myths in critical patients <b>Nicola Ackerman (UK)</b>	<b>08:15–09:00</b> Caesareans <b>Paul Aldridge (UK)</b>  <b>09:10–09:55</b> The VN's role during acute surgical haemorrhage <b>Claire Roberts (UK)</b>	<b>08:15–09:00</b> Dog bite prevention: in practice or on the street <b>Shakira Free Miles (UK)</b>  <b>09:10–09:55</b> Adopting street dogs: health and behaviour concerns <b>Heather Bacon (UK)</b>	 <b>07:00–08:00</b> Yoga for all  <b>10:15–10:40</b> Top tips to identify when cats need analgesia <b>Jo Murrell</b>  <b>10:45–11:10</b> Understanding a cat's quality of life <b>Jacky Reid</b>  <b>11:20–11:45</b> Current understanding of diagnosing and managing feline osteoarthritis <b>Evelyn Maniaki</b>  <b>12:30–12:55</b> Benefits of wellness screens in cats <b>Joanna Parker</b>  <b>13:00–13:25</b> Challenges of compliance in cats <b>Louise Longstaff</b>  <b>13:40–14:05</b> What is CIR? Should we worry? <b>Jenny Stavisky</b>  <b>14:10–14:35</b> Challenges of preventing canine infectious respiratory disease <b>Jenny Stavisky</b>	<b>08:00–09:00</b> Executive 1, ICC SMALL GROUP SESSION – VET Breakfast with a specialist <b>Jon Bray (UK)</b>  <b>09:00–10:30</b> Repeated at 11:15–12:45 and 15:00–16:30 Lodges, Austin Court PRACTICAL – VET Flexible endoscopy <b>Paul Higgs (UK)</b> <b>David Walker (UK)</b> <b>Sophie Keyte (UK)</b> <b>Florent Duplan (UK)</b> <b>Lucy Barker (UK)</b>   <b>09:45–12:45</b> Executive 1, ICC SMALL GROUP SESSION – VN Anaesthesia: case-based discussions <b>Emma Archer (UK)</b>  <b>14:00–17:00</b> Executive 1, ICC SMALL GROUP SESSION – OPEN TO ALL Obesity: turning failure into success <b>Alex German (UK)</b>
Morning Tea & Coffee Break							
<b>11:05–11:50</b> How to look at a CT scan: a beginner's guide <b>Matthew Winter (UK)</b>	<b>11:05–11:50</b> Understanding the financial basics <b>Georgina Hills (UK)</b>	<b>11:05–11:50</b> Research into small animal practice: why evidence matters <b>Peter Denys Cockcroft (UK)</b>	<b>10:50–11:35</b> Common toxins in dogs <b>Sarah Egleston (UK)</b>	<b>10:50–11:35</b> Does what we wear in the theatre, impact patient safety? <b>Claire Roberts (UK)</b>	<b>10:50–11:35</b> Good intentions and good welfare outcomes <b>Hayley Walters (UK)</b>		
<b>12:00–12:45</b> Breathe in: thoracic CT <b>Chris Warren-Smith (UK)</b>	<b>12:00–12:45</b> How practice finances work <b>Miles Russell (UK)</b> 	<b>12:00–12:45</b> Learning from a rabbit anaesthetic death: implementing an evidence-based approach to rabbit anaesthesia in a practice setting <b>Molly Varga (UK)</b> <b>Pam Mosedale (UK)</b>	<b>11:45–12:30</b> Bleeding nightmares <b>Emily Thomas (UK)</b>	<b>11:45–12:30</b> Thoracic wall trauma <b>Paul Aldridge (UK)</b>	<b>11:45–12:30</b> Positive patient welfare: what the RVN can do <b>Hayley Walters (UK)</b>		
<b>13:15 Upper deck, BSAVA Stand</b> Pain in companion animals – where have come from and what is the future of pain treatment? <b>Ian Self</b>				<b>Lunch in Arena Birmingham</b>			
<b>14:05–14:50</b> Around the abdomen: indications for abdominal CT <b>Matthew Winter (UK)</b>	<b>14:05–14:50</b> Team development <b>Renay Rickard (UK)</b>	<b>14:05–15:45</b> First do no harm: how systems can reduce the rate of morbidity and mortality by 50% <b>Richard Killen (UK)</b> <b>Laura Playforth (UK)</b> <b>Richard Byrne (UK)</b>	<b>13:50–14:10</b> How to manage a chest drain <b>Emily Thomas (UK)</b>  <b>14:15–14:35</b> How to place nasal oxygen catheters <b>Sarah Egleston (UK)</b>  <b>14:45–15:30</b> Nursing the septic abdomen patient <b>Sarah Egleston (UK)</b>	<b>13:50–14:10</b> Pre-op surgical site infection prevention <b>Claire Roberts (UK)</b>  <b>14:15–14:35</b> How to reduce post-op HAI <b>Claire Roberts (UK)</b>  <b>14:45–15:30</b> Difficult skin closures: what options do we have? <b>Paul Aldridge (UK)</b>	<b>13:50–14:35</b> Breed-specific legislation <b>Shakira Free Miles (UK)</b>  <b>14:45–15:30</b> Geriatric welfare <b>Heather Bacon (UK)</b>	<b>14:45–15:10</b> Diagnosing pancreatitis: the benefits of cPL testing <b>Joanna Parker</b>  <b>15:25–15:50</b> Apquel/ Cytopoint: innovative products to support management of stressful dermat cases <b>Stan Baker</b>  <b>15:55–16:20</b> Top tips on managing stress and enhancing wellbeing <b>David Bartram</b>	<b>CLINICAL ABSTRACTS</b> <b>Austin Court</b> <b>BOULTON ROOM</b>  <b>08:30–10:15</b> Dermatology, infectious diseases and antimicrobials  <b>11:05–12:20</b> Cardiology and respiratory  <b>14:45–15:45</b> Oncology  <b>16:50–18:05</b> Oncology  <b>TELFORD ROOM</b>  <b>08:30–10:15</b> Soft tissue surgery  <b>14:30–15:45</b> Neurology  <b>16:50–18:05</b> Anaesthesia
<b>15:00–15:45</b> A headache or a pain in the neck? Head and neck CT <b>Chris Warren-Smith (UK)</b>	<b>15:00–15:45</b> Getting the best out of clinical workflow <b>Gillian Page (UK)</b> 						
Afternoon Tea & Coffee Break							
<b>16:50–17:35</b> Give the dog a bone: orthopaedic CT <b>Chris Warren-Smith (UK)</b>	<b>16:50–17:35</b> Crisis, what crisis? <b>Julie Beacham (UK)</b>	<b>16:50–17:35</b> Reliable care in the NHS: building safer systems in a just culture <b>Margaret Mary Devaney (UK)</b>	<b>16:35–17:20</b> Dying to pee: nursing the blocked cat <b>Suzanne Rudd (UK)</b>	<b>16:35–17:20</b> Loco-regional blocks <b>Louise O'Dwyer (UK)</b>	<b>16:35–17:20</b> Welfare conundrums <b>Heather Bacon (UK)</b>		
<b>17:45–18:30</b> Could I, should I, would I? When can I use spinal CT? <b>Matthew Winter (UK)</b>	 <b>Friday 5 April · Hall 5, ICC · 20:00</b> Join us for a relaxed showing of MAMMA MIA! Here We Go Again on Friday evening.		<b>17:30–18:15</b> Managing the dyspnoeic patient <b>Emily Thomas (UK)</b>	<b>17:30–18:15</b> Rehabilitation of orthopaedic patients <b>Holly Smith (UK)</b>	<b>17:30–18:15</b> Acute pain and its welfare implications <b>Hayley Walters (UK)</b>	 <b>Don't forget to book your ticket for</b> <b>V19 BEACH PARTY</b> <b>Saturday 6 April</b> <b>ICC from 19:30</b>	
17:00–18:30 Drinks in the Exhibition							

# Programme · Saturday 6 April

Hall 1	Hall 3	Hall 4	Hall 5	Hall 6	Hall 7	Hall 8
<b>CRITICAL CARE</b> BSAVA Manual of Canine and Feline Emergency and Critical Care, 3rd edition	<b>FANTASTIC FOREIGN BODIES AND HOW TO FIND THEM!</b>	<b>NEUROLOGY</b>	<b>CARDIORESPIRATORY</b>	<b>SHELTER MEDICINE</b> BSAVA Manual of Canine and Feline Shelter Medicine	<b>EFFECTIVE COMMUNICATION</b> 	<b>IMAGING</b>
<b>08:30–09:15</b> Basic introduction to the use of blood gases <b>Dan Lewis (UK)</b>	<b>08:30–09:15</b> Tracking foreign bodies: a review of imaging techniques <b>Francisco Llabres Diaz (UK)</b>	<b>08:30–09:15</b> How to get the most from your neuro exam <b>Steven De Decker (UK)</b>	<b>08:30–09:15</b> Approach to the young coughing dog <b>Simon Tappin (UK)</b>	<b>08:30–09:15</b> Caring for pets of homeless people <b>Jenny Stavisky (UK)</b> <b>Ruth Serlin (UK)</b>	<b>08:30–09:15</b> You're different from me: four communication styles <b>Alan Robinson (UK)</b>	<b>08:30–09:15</b> Is this a bone tumour? Differentiating benign and malignant bone disease with radiographs <b>Jennifer Kinns (UK)</b>
<b>09:25–10:10</b> Advanced blood gas analysis <b>Dan Lewis (UK)</b>	<b>09:25–10:10</b> Foreign bodies of the head <b>Jon Bray (UK)</b>	<b>09:25–10:10</b> Cerebrovascular disease: do dogs have strokes? <b>Rick LeCouteur (USA)</b>	<b>09:25–10:10</b> Older dog with a cough: is it cardiac or respiratory? Top tips on how to tell <b>Simon Tappin (UK)</b>	<b>09:25–10:10</b> A pragmatic approach to dog diarrhoea in the shelter environment <b>Jenny Stavisky (UK)</b>	<b>09:25–10:10</b> Meetings, meetings: make them work <b>Alan Robinson (UK)</b>	<b>09:25–10:10</b> A waste of time? Should we still be doing skull radiographs in 2019? <b>Jennifer Kinns (UK)</b>
<b>Morning Tea &amp; Coffee Break</b>						
<b>11:05–11:50</b> Techniques for oxygen therapy <b>Dan Lewis (UK)</b>	<b>11:05–11:50</b> Endoscopic management of foreign bodies <b>David Walker (UK)</b>	<b>11:05–11:50</b> Poorly puppies: neurological disease in the young animal <b>Steven De Decker (UK)</b>	<b>11:05–11:50</b> Approach to pulmonary hypertension <b>Kieran Borgeat (UK)</b>	<b>11:05–11:50</b> Prepubertal neutering: a pragmatic approach <b>David Yates (UK)</b>	<b>11:05–11:50</b> When they say 'No': managing expectations <b>Alan Robinson (UK)</b>	<b>11:05–11:50</b> Is this elbow dysplasia? What radiographs tell us and when to use CT <b>Francisco Llabres Diaz (UK)</b> 
<b>12:00–12:45</b> Nutrition in critical care <b>Isuru Gajanayake (UK)</b>	<b>12:00–12:45</b> 'For the chop': surgical management of thoracic and abdominal foreign bodies <b>Georga Karbe (UK)</b>	<b>12:00–12:45</b> Cervical spondylomyelopathy ('Wobblers'): diagnosis and treatment options <b>Steven De Decker (UK)</b>	<b>12:00–12:45</b> How I perform a bronchoscopy <b>Simon Tappin (UK)</b>	<b>12:00–12:45</b> A pragmatic approach to the skinny old cat in the shelter environment <b>Rachel Dean (UK)</b>	<b>12:00–12:45</b> Could do better: managing high performers <b>Alan Robinson (UK)</b>	<b>12:00–12:45</b> From head to tail, imaging the neurological patient: when are radiographs still useful? <b>Francisco Llabres Diaz (UK)</b>
<b>Lunch in Arena Birmingham</b>				<b>AVP</b>	<b>13:15 Upper deck, BSAVA Stand</b> Getting the balance right: biosecurity versus cats' welfare needs in shelters <b>Maggie Roberts</b>	
<b>14:05–14:50</b> Approach to DKA <b>Sophie Keyte (UK)</b>	<b>14:05–14:50</b> Needle in a haystack: dealing with tracking foreign bodies <b>Georga Karbe (UK)</b>	<b>14:05–14:50</b> Spinal cord disorders on a budget <b>Rick LeCouteur (USA)</b>	<b>14:05–14:50</b> Thoracic imaging picture quiz: is it cardiac or is it respiratory? <b>Kieran Borgeat (UK)</b> 	<b>14:05–14:50</b> Ophthalmological manifestation of systemic disease <b>Ben Blacklock (UK)</b>	<b>14:05–14:50</b> All together now: creating team dynamics <b>Alan Robinson (UK)</b>	<b>14:05–14:50</b> Now, your turn: interactive orthopaedic film reading <b>Jennifer Kinns (UK)</b> 
<b>15:00–15:45</b> Emergency management of urethral obstruction <b>JD Foster (USA)</b>	<b>15:00–15:45</b> The recurrent foreign body: what to do next? <b>Jon Bray (UK)</b>	<b>15:00–15:45</b> Cranial nerve disorders: figuring out the floppy faces <b>Rick LeCouteur (USA)</b>	<b>15:00–15:45</b> The punctured pet: dealing with thoracic bite wounds/stick injuries <b>Georga Karbe (UK)</b>	<b>15:00–15:45</b> Cardiac manifestation of systemic disease <b>Ruth Willis (UK)</b>	<b>15:00–15:45</b> Five signs of a high performance team <b>Alan Robinson (UK)</b>	<b>15:00–15:45</b> Now, your turn: interactive head and neck film reading <b>Raquel Salguero (SP)</b> 
<b>Afternoon Tea &amp; Coffee Break</b>						
<b>16:50–17:35</b> Acute kidney injury <b>JD Foster (USA)</b>		<b>16:50–17:35</b> A logical approach to vestibular disease <b>Steven De Decker (UK)</b>	<b>16:50–17:10</b> Top tips on chest drain placement <b>Georga Karbe (UK)</b> <b>17:15–17:35</b> Top tips on thoracic cytology <b>Kathleen Tennant (UK)</b>	<b>16:50–17:35</b> Management of refractory epilepsy <b>Jeremy Rose (UK)</b>	<b>16:50–17:35</b> Yes, please: improving client compliance <b>Alan Robinson (UK)</b>	<b>16:50–17:35</b> Orthopaedic weird and wonderful: an interactive radiographic journey <b>Jennifer Kinns (UK)</b> 
<b>17:45–18:30</b> Management of canine acute pancreatitis <b>Isuru Gajanayake (UK)</b>		<b>17:45–18:05</b> Diagnosis and medical management of pyothorax <b>Simon Tappin (UK)</b> <b>18:10–18:30</b> Diagnosis and surgical management of pyothorax <b>Georga Karbe (UK)</b>	<b>17:45–18:30</b> Acute kidney injury: practical management <b>David Walker (UK)</b>	<b>17:45–18:30</b> Difficult client or difficult communication? <b>Alan Robinson (UK)</b>	<b>17:45–18:30</b> Now your turn: interactive spine film reading <b>Francisco Llabres Diaz (UK)</b> 	
<b>17:00–18:30 V19 Pre Drinks in the Exhibition Arena Birmingham / Exhibition closes at 18:30</b>						

Education Zone, Arena	Hall 9	Hall 10	Hall 11	Kingston Theatre	Vista Room, Arena	Venues as listed
EXHIBITOR STREAM	ONCOLOGY	MEDICINE	ANAESTHESIA BSAVA Vn Heart awards	LOCO-REGIONAL ANAESTHESIA	ZOETIS LEARNING ACADEMY	OTHER CPD 📌
<b>09:10–09:55</b> Rampant regurg and remorseless reflux: how to deal with these unwanted visitors in anaesthetised dogs <b>Ian Self</b>  docsinnovent® <b>10:05–10:50</b> How health plans can unlock hidden value in your practice <b>Liam Moriarty, CEO &amp; Founder of TrustVet</b>  TrustVet <b>11:00–11:45</b> Sutures <b>Julian Hoad</b>  PetSavers <b>12:00–12:45</b> Canine nutrition trends: facts, fads & fiction <b>Sean McCormack</b>  Tails.com <b>13:00–13:45</b> Helping the veterinary profession to resolve and minimise complaints and retain client relationships <b>Jennie Jones</b>  Blue Cross <b>14:00–15:30</b> Gut stasis: it takes two <b>Molly Varga Jo Hinde</b>  SUPREME <b>15:45–16:30</b> ‘He’s just slowing down’: Early identification of Canine OA and how to work within owners budgets <b>Hannah Capon</b>  Limbells Veterinary <b>17:30–18:15</b> Client support for patients with terminal illness <b>Fiona McDowall (UK)</b>	<b>08:15–09:00</b> Common cancers and paraneoplastic syndromes <b>Fiona McDowall (UK)</b> <b>09:10–09:55</b> Oncology emergencies <b>Nicola Read (UK)</b> <b>10:50–11:35</b> Staging the oncology patient <b>Nicola Read (UK)</b> <b>11:45–12:30</b> Radiotherapy <b>Linda Roberts (UK)</b> <b>13:50–14:35</b> Chemotherapy: administration and adverse effects <b>Fiona McDowall (UK)</b> <b>14:45–15:30</b> Palliative care for cancer patients <b>Linda Roberts (UK)</b> <b>16:35–17:20</b> Novel treatments: what’s new and advances <b>Nicola Read (UK)</b> <b>17:30–18:15</b> Client support for patients with terminal illness <b>Fiona McDowall (UK)</b>	<b>08:15–09:00</b> IBD <b>Gina Parkes (UK)</b> <b>09:10–09:55</b> Diabetes mellitus: let’s not sugar coat it! <b>Gina Parkes (UK)</b> <b>10:50–11:35</b> Feline diabetes: they are not small diabetic dogs <b>Gina Parkes (UK)</b> <b>11:45–12:30</b> DKA <b>Gina Parkes (UK)</b> <b>13:50–15:30</b> Transfusion medicine and common bleeding disorders <b>Rachel Pickes (UK)</b> <b>16:35–18:15</b> Endocrinology <b>Rachel Pickes (UK)</b>	<b>08:15–09:00</b> The pre-anaesthetic exam <b>Emma Archer (UK)</b> <b>09:10–09:55</b> Anaesthesia of the head trauma patient <b>Denise Prisk (UK)</b> <b>10:50–11:35</b> Anaesthesia of the RTA cat <b>Claire Woolford (UK)</b> <b>11:45–12:30</b> Anaesthesia of the brachycephalic patient <b>Denise Prisk (UK)</b> <b>13:50–14:35</b> Anaesthesia of the young and old <b>Emma Archer (UK)</b> <b>14:45–15:30</b> Anaesthesia for the acute abdomen <b>Claire Woolford (UK)</b> <b>16:35–16:55</b> Central lines <b>Claire Woolford (UK)</b> <b>17:00–17:20</b> Arterial lines <b>Claire Woolford (UK)</b> <b>17:30–18:15</b> Anaesthesia and analgesia of patients with complex medical conditions <b>Emma Archer (UK)</b>	<b>08:30–09:15</b> Basic LA plus pharmacology <b>Jaime Viscasillas (UK)</b> <b>09:25–10:10</b> LA equipment <b>Matt Read (USA)</b> <b>11:05–11:50</b> Local block in the head <b>Jaime Viscasillas (UK)</b> <b>12:00–12:45</b> Thoracic limb LA techniques <b>Matt Read (USA)</b> <b>14:05–14:50</b> Epidural anaesthesia <b>Jaime Viscasillas (UK)</b> <b>15:00–15:45</b> Pelvic limb LA techniques <b>Matt Read (USA)</b> <b>16:50–17:35</b> Abdominal/thoracic LA techniques <b>Matt Read (USA)</b> <b>17:45–18:30</b> LA and analgesia cases – interactive <b>Matt Read (USA)</b> <b>Jamie Viscasillas (UK)</b>	 ZOETIS LEARNING ACADEMY <b>07:00–08:00</b> Yoga for all <b>10:00–10:25</b> Top tips for the first presentation of a pruritic dog <b>Kate Griffiths</b> <b>10:30–10:55</b> When is Apoguel indicated? <b>Louise Longstaff</b> <b>11:00–11:25</b> An update on canine demodicosis and top tips on diagnosing and treating <b>Kate Griffiths</b> <b>11:50–12:15</b> Optimising compliance in chronic atopic dermatitis cases <b>Kate Griffiths</b> <b>12:25–12:50</b> Match that scratch: case-based examples of complex pruritic patients <b>Victoria Robinson</b> <b>12:55–13:20</b> What to do next: top tips on managing chronic dermatitis cases <b>Victoria Robinson</b> <b>13:30–13:55</b> Which patients are most suited to Cytopoint <b>Sophie Duguid</b> <b>CLINICAL ABSTRACTS</b> <b>Austin Court</b> <b>BOULTON ROOM</b> <b>09:00–10:15</b> Exotics <b>11:05–12:50</b> Therapeutics, non clinical, behaviour and welfare <b>14:00–15:45</b> Haematology/immunology <b>16:50–18:05</b> Haematology/immunology <b>FARADAY ROOM</b> <b>08:30–10:30</b> Ophthalmology <b>10:50–12:50</b> Orthopaedics <b>14:30–16:00</b> Orthopaedics <b>16:50–17:35</b> Orthopaedics	<b>08:00–09:00</b> Executive 1, ICC SMALL GROUP SESSION – VET Breakfast with a specialist <b>Karen Perry (USA)</b> <b>08:30–11:30</b> Lodges, Austin Court PRACTICAL – VET Drains <b>Rachel Hattersley (UK)</b> <b>Tom Cox (UK)</b> <b>08:30–11:30</b> Executive 2, ICC SMALL GROUP SESSION – VET Reptile anaesthesia, analgesia and sedation <b>Chris Mans (USA)</b> <b>09:30–12:30</b> Executive 1, ICC SMALL GROUP SESSION – VET Ocular emergencies <b>Ben Blacklock (UK)</b> <b>14:00–17:00</b> Executive 1, ICC SMALL GROUP SESSION – VET Extraction complications in cats and dogs: prevention and treatment <b>Phillipe Hennet (FR)</b> <b>Alex Smithson (UK)</b>
<b>Morning Tea &amp; Coffee Break</b>						
<b>Lunch in Arena Birmingham</b>						
<b>Afternoon Tea &amp; Coffee Break</b>						
<b>17:00–18:30 V19 Pre Drinks in the Exhibition Arena Birmingham / Exhibition closes at 18:30</b>						

# Programme · Sunday 7 April

Hall 1	Hall 4	Hall 5	Hall 6	Hall 7	Hall 8
<b>MY PRAGMATIC APPROACH TO...</b>	<b>CARDIOLOGY</b>	<b>ORTHOPAEDICS</b> BSAVA Manual of Canine and Feline Musculoskeletal Disorders, 2nd edition	<b>IMMUNOLOGY</b>	<b>MANAGEMENT</b>	<b>SAFETY STREAM</b>
09:00–09:45 PU/PD Sophie Keyte (UK)	09:00–09:45 Cardiac therapeutics: atrioventricular valve disease Sonya Gordon (USA)	08:45–09:30 FL lameness in cats: sources and solutions Karen Perry (USA)	08:45–09:30 Understanding immunological testing James Swan (UK)	08:45–09:30 Top 5 reasons vets get sued and how to avoid them as a recent graduate Dave Nicol (AUS)	08:45–09:30 Pre-op safety and preparation: what really helps and do pre-op bloods improve outcome? Matt Read (UK)
09:55–10:40 Hypercalcaemia Sophie Keyte (UK)	09:55–10:40 Cardiac therapeutics: feline cardiology Kieran Borgeat (UK)	<b>Morning Tea &amp; Coffee Break</b>			
		10:05–10:55 HL lameness in cats: sources and solution Karen Perry (USA)	10:05–10:55 Immune-mediated skin disease Laura Buckley (UK)	10:05–10:55 Putting you first: how to manage body and mind to avoid burnout, depression and other negatives Dave Nicol (AUS)	10:05–10:55 How equipment harms patients Matt McMillan (UK)
<b>Morning Tea &amp; Coffee Break</b>					
11:15–12:00 Juvenile lameness Duncan Barnes (UK)	11:15–12:00 Cardiac therapeutics: dilated cardiomyopathy Sonya Gordon (USA)	11:00–11:45 Feline OA: diagnosis and management Karen Perry (USA)	11:00–11:45 Novel immunotherapy James Swan (UK)	11:00–11:45 Personal branding for vets: why you need one and how to become the local pet celebrity Dave Nicol (AUS)	11:00–11:45 How to use checklists to improve safety (and how not to) Matt McMillan (UK)
12:10–12:55 Seizures Jeremy Rose (UK)	12:10–12:55 Cardiac therapeutics: medical treatment of arrhythmias (in dogs with DCM) Sonya Gordon (USA)	<b>Coastal Cookout Hall 3, ICC</b>			
		13:05–13:50 Coronoid disease in dogs: where are we now? Laura Cuddy (IE)	13:05–13:50 Glomerulonephritis JD Foster (UK)	 <b>CONGRESS PODCASTS</b> <b>Did you know?</b> BSAVA members get complimentary access to audio and video podcasts a couple of weeks after Congress closes. Podcast access can also be purchased for £100. Visit the BSAVA stand or go to <a href="http://www.bsava.com">www.bsava.com</a> for more information. 	13:05–13:50 What anaesthetic monitoring really helps Matt McMillan (UK)
<b>Coastal Cookout Hall 3, ICC</b>		14:00–14:45 Humeral intercondylar fissures in dogs Laura Cuddy (IE)	14:00–14:20 How to collect CSF samples Paul Higgs (UK)		14:00–14:45 Clinical audit: how to set up Pam Mosedale (UK)
14:15–15:00 Prescription foods Isuru Gajanayake (UK)	14:15–15:00 Challenging cases: approach to the patient with cardiac disease and renal dysfunction JD Foster (USA)	14:55–15:40 Ununited anconeal process: what to do? Laura Cuddy (IE)	14:25–14:45 How to perform joint taps Paul Higgs (UK)		14:55–15:40 An anaesthetist's day from hell: interactive cases Matt McMillan (UK) Matt Read (UK)
15:10–15:55 Pruritic skin disease Laura Buckley (UK)	15:10–15:55 Challenging cases: approach to the cardiac patient with concurrent respiratory disease Kieran Borgeat (UK)	15:50–16:35 Elbow incongruence: what to do when Laura Cuddy (IE)	14:55–16:35 Stiff, painful and pyrexia: an interview with a medic, neurologist and orthopaed Duncan Barnes (UK) Vicki Black (UK) Jeremy Rose (UK)		15:50–16:35 M and M rounds Catherine Oxtoby (UK)
16:05–16:55 Chronic diarrhoea Eilidh Gunn (UK)	16:05–16:55 Cardiac therapeutics: pericardial disease Sonya Gordon (USA)				
<b>CONGRESS CLOSES</b>					
Thank you for being part of BSAVA Congress 2019. Join us next year in Birmingham 2–5 April 2020					

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BEYOND THE CLINICS



INTERACTIVE



ADVANCE PURCHASE REQUIRED

Hall 9	Hall 10	Hall 11	Kingston Theatre	Telford Room	Venues as listed
<b>EXOTICS</b>	<b>NURSING LEADERSHIP AND MANAGEMENT</b>	<b>NUTRITION</b> 	<b>AGM</b>	<b>BEYOND THE CLINICS VDS TRAINING OPEN TO ALL</b>	<b>OTHER CPD</b>
09:20–10:05 Help: rabbit anaesthesia Jo Hinde (UK)	09:20–10:05 Leadership: what are the benefits for RVNs Liz Cox (UK)	09:20–10:05 Making and implementing a nutritional assessment Georgia Woods (UK)		09:00–09:45 Taking time out to get time back Penny Barker (UK)	
<b>Morning Tea &amp; Coffee Break</b>			10:45–12:00 <b>BSAVA AGM</b> All BSAVA Members welcome 	09:55–10:40 The three Ps for having a good day: present, proactive and positive Carolyne Crowe (UK)	10:15–12:15  <b>Executive 1, ICC SMALL GROUP SESSION – VN</b> Better vet visits: working towards fear free practice Linda Ryan (UK)
10:40–11:25 Preventative medicine for rabbits Jo Hinde (UK)	10:40–11:25 Challenges of the head nurse and how to lead your team effectively Renay Rickard (UK)	10:40–11:25 Compliance for nutritional recommendations Georgia Woods (UK)		<b>Coffee Break</b>	
11:35–12:20 Rabbit obesity clinics Jo Hinde (UK)	11:35–12:20 Leadership skills for all roles Liz Cox (UK)	11:35–12:20 Feeding the renal patient Georgia Woods (UK)		11:15–12:00 Learning into colleagues, clients and cases Carolyne Crowe (UK)	
<b>Coastal Cookout Hall 3, ICC</b>			<b>IN CONVERSATION WITH...</b>	12:10–12:55 Stepping up and speaking out Penny Barker (UK)	
13:35–14:20 Nursing patients with ileus Jo Hinde (UK)	13:35–14:20 Managing your team through a change Renay Rickard (UK)	13:35–14:20 Nutritional management of the hyperthyroid cat Georgia Woods (UK)	13:35–14:20 <b>Pete Wedderburn (IRE)</b> BSAVA President Phil Lhermette in conversation with Pete Wedderburn, a small animal vet, journalist and broadcaster 		
14:30–15:15 Is it all about hay and grass: rabbit nutrition Nicola Ackerman (UK)	14:30–15:15 Swapping between leadership and management: multi-tasking nurses! Liz Cox (UK)	14:30–15:15 Nutritional management of gastrointestinal disease I Aarti Kathrani (UK)			
15:20–16:05 Exotic pet welfare and ethics Shakira Free Miles (UK)	15:20–16:05 A simple approach to development reviews Renay Rickard (UK)	15:20–16:05 Nutritional management of gastrointestinal disease II Aarti Kathrani (UK)			
 <b>JOIN BSAVA TODAY</b> BSAVA members enjoy substantial savings on Congress registration along with a host of other benefits. Join today for exceptional value CPD courses, great savings on BSAVA publications, access to exclusive member only online resources and much more. Visit the stand in Hall 3 Foyer or go to <a href="http://www.bsava.com">www.bsava.com</a> .					
<b>MAPPING YOUR FUTURE</b> <b>Hall 1 and 3 Foyer 10:00–14:00</b> Join us at the Mapping your Future career diversity fair, with practical career insight from: <ul style="list-style-type: none"> <li>■ PDSA</li> <li>■ Vets4Pets</li> <li>■ WVS and Mission Rabies</li> <li>■ Cats Protection</li> <li>■ Educational               <ul style="list-style-type: none"> <li>- BSAVA Volunteering</li> <li>- PG Certificates</li> <li>- AVP, Resident, Intern, Clinician</li> </ul> </li> <li>■ FIVP</li> <li>■ CVS</li> <li>■ Medivet</li> <li>■ Vets Now</li> <li>■ SPVS/VMG</li> <li>■ APHA</li> <li>■ DEFRA</li> <li>■ GVS</li> <li>■ AGV</li> <li>■ Vetlife</li> </ul>					

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## Section II

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# Our speakers

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# Our speakers

## Nicola Ackerman

**BSc(Hons) RVN CertSAN CertVNECC  
VTS(Nutrition) HonMBVNA**

Nicola Ackerman works as the Head Medical Nurse at The Veterinary Hospital in Plymouth, UK. Nicola graduated from Hartpury College with an honours degree in Equine Science, and subsequently qualified as a veterinary nurse in 2002. Nicola has written for many veterinary publications and textbooks, and is the editor of Aspinall's Complete Textbook of Veterinary Nursing and is on the editorial board of The Veterinary Nurse. Nicola won the BVNA/Blue Cross award for animal welfare in 2010, various SQP awards in 2011, 2012, 2013 and 2014, and the College of Animal Welfare Professional Development Award in 2012. Nicola is currently studying for a Master's degree in Advanced Veterinary Nursing with Glasgow University.



## Sophie Adamantos

**BVSc CertVA DipACVECC  
DipECVECC FHEA MRCVS**

Sophie Adamantos graduated from Liverpool and worked in first opinion and referral practices prior to becoming a Diplomate of the American College of Veterinary Emergency and Critical Care in 2005. Sophie remained at the RVC as a lecturer and then senior lecturer. Sophie spent 5 years developing the ICU and acute medicine services at Langford Veterinary Specialists before becoming Clinical Director of Paragon Veterinary Referrals in November 2018. Sophie enjoys all aspects of emergency and acute medicine.



## Paul Aldridge

**BVSc CertSAS MRCVS**

Paul Aldridge graduated from the University of Liverpool, and currently works as staff surgeon at Vets Now Referrals in Manchester where he sees referred soft tissue and orthopaedic cases. His clinical interests include all areas of traumatology and acute abdominal surgery. Paul is widely involved in delivering CPD, both nationally and internationally.



## Emma Archer

**RVN DipAVN(Surgical)  
VTS(Anaesthesia)**

Emma Archer qualified as a Veterinary Nurse in 2001 in general practice, gaining her advanced veterinary nursing diploma (surgical) in 2006. Since 2008, she has been an Anaesthesia Technician at The Animal Health Trust and is a Veterinary Technician Specialist (VTS) in Anaesthesia & Analgesia and a member of the Academy of Veterinary Technician Anaesthetists. Emma is passionate about continuing education and has a keen interest in teaching and CPD for veterinary nurses and is currently undertaking an MSc.



## Heather Bacon

**BSc(Hons) BVSc CertZooMed MRCVS**

Heather Bacon graduated from the University of Bristol and, after several years working overseas, now runs international veterinary training projects out of the Jeanne Marchig International Centre for Animal Welfare Education at the University of Edinburgh; Heather has a keen interest in dog behaviour and welfare, veterinary training and zoological medicine.



## Lucy Barker

**BVMBVS BVMedSci PGCert**

Lucy Barker is a graduate from the University of Nottingham. She is currently a second year resident in small animal internal medicine at the University of Bristol, and has a keen interest in all areas of internal medicine.



## Penny Barker

**BVetMed BSc MRCVS**

Penny Barker is a Royal Veterinary College graduate, former small animal vet, programme manager and management consultant. She has a passion for helping people to both realise their potential and to work more effectively together. This led her to becoming a NLP Practitioner and gaining Diplomas in both personal and corporate coaching. She now runs her own leadership coaching and team development business as well as working back within the profession she loves as an associate with VDS training.



## Duncan Barnes

**MA VetMB DipSAS(Ortho) MRCVS RCVS  
Recognised Specialist in Small Animal Surgery  
(Orthopaedics)**

Duncan Barnes qualified from the University of Cambridge in 2001, and spent 9 years in general small animal practice, where he gained the RCVS Certificate of Small Animal Surgery (CertSAS) in 2006. In 2010 he set up the orthopaedic referral service at Eastcott Referrals in Swindon, and he completed a part-time externship at Anderson Abercromby Veterinary Referrals in 2014. He was awarded the RCVS Diploma in Small Animal Orthopaedics, completing this via the alternate track, in August 2016. Duncan is currently head of the orthopaedics department at Eastcott Referrals.



## Dan Batchelor

**BVSc PhD DipSAM DipECVIM-CA MRCVS**

Dan Batchelor is a Bristol graduate and a European and RCVS Specialist in Small Animal Internal Medicine. Dan works at the University of Liverpool Institute of Veterinary Science and is Head of Small Animal Medicine; he has an interest in all areas of internal medicine.



## Julie Beacham

**BSc(Hons) CVPM**

Julie Beacham has over 20 years' experience in the veterinary world and manages Wendo-over Heights Veterinary Centre, a large, mixed, independent practice in Buckinghamshire. She relishes the diversity and unpredictability of the role and enjoys finding solutions to the problems that arise. Julie has been a member of the Veterinary Practice Management Association (VPMA) Council & Board since 2011, was a member of the Certification and Training Committee for six years, and is now the 2018-2019 President under its new name, The Veterinary Management Group.



## Laura Black RVN

**CertNEBOSH (Occupational Health and Wellbeing) (Occupational Health & Safety)**

Laura Black has been a Veterinary Nurse for 26 years, working in both private and charity sectors. She is Head of Health, Safety & Wellbeing at Vets Now. She has a keen interest in improving wellbeing within our profession, through raising awareness of good mental health, encouraging the practice team to look after themselves and improving the quality of sleep.



## Vicki Black

**MA VetMB ECVIM-CA FHEA MRCVS**

Vicki Black graduated from University of Cambridge Veterinary School in 2009 and worked in small animal practice before completing an internship at Davies Veterinary Specialists and a residency at Bristol Veterinary School in 2016. Since achieving her European Diploma in Small Animal Internal Medicine she has remained at Bristol Veterinary School as a Clinical Teaching Fellow. Vicki has a special interest in haematological and immune-mediated disorders.



## Ben Blacklock

**BVSc(Hons) DipECVO MRCVS**

Ben Blacklock graduated from the University of Bristol in 2009. After spending time in mixed practice in Lancashire, he undertook an internship and then residency in ophthalmology at the Animal Health Trust in Newmarket. Upon completion of his residency, Ben moved to Dick White Referrals. He is an RCVS and European Specialist in Ophthalmology.



## Kieran Borgeat

**BSc(Hons) BVSc MVetMed(Dist) CertVC DipACVIM DipECVIM-CA MRCVS**

Kieran Borgeat is a Bristol graduate, who completed his Certificate in Veterinary Cardiology in general practice and then completed a Residency and Masters degree at the Royal Veterinary College. He is an American and European Diplomate and an RCVS Recognised Specialist in Cardiology. He is Clinical Lead in Cardiology at Langford Vets, University of Bristol. He is particularly interested in



interventional procedures, cardiac therapeutics, feline myocardial disease and clinical decision making processes.

## Peter Borriello

**PhD**

Peter Borriello is a microbiology graduate and Fellow of University College London. His career history includes appointment as Head of a Medical Research Council Unit working on pathogenicity of bacterial infections; founding Director of the Institute of Infections and Immunity, University of Nottingham; and was appointed Director of the Central Public Health Laboratory, which was the National Centre for Reference Microbiology, and then Director of the Government a centre for Infections. His last post was as Chief Executive of the Veterinary Laboratories Agency. He is currently Chief Executive of the Veterinary Medicines Directorate.



## Kelly Bowlt

**Blacklock BVM&S DipECVS PGCert FHEA MRCVS**

Kelly Bowlt graduated from the University of Edinburgh in 2005 and after 18 months in small animal general practice, completed a rotating internship at the Royal Veterinary College and a three-year ECVS approved residency programme in Small Animal Surgery at the University of Bristol. Kelly joined the Animal Health Trust in 2011, where her particular interests include minimally invasive surgery, trauma management and reconstructive/oncological surgery. She is a member of the European College of Veterinary Surgeons (ECVS) and the Association of Veterinary Soft Tissue Surgeons (AVSTS).



## Jonathan Bray

**MVSc MSc(Clin Onc) MANZCVS CertSAS DipECVS MRCVS**

Jonathan Bray graduated from Massey University, New Zealand in 1988 and became a Diplomate of the European College of Veterinary Surgeons in 1997. He obtained a Master's degree in Veterinary Science in 1990, and a Master's degree in Clinical Oncology in 2013. He is currently completing a PhD, with the hope of developing better prognostic tools and treatments for soft tissue sarcoma. Jonathan is now a Senior Surgeon at Fitzpatrick Referrals Oncology and Soft Tissue in Guildford, UK.



## Laura Buckley

**BVetMed CertVD DipECVD MRCVS**

Laura Buckley is a Royal Veterinary College graduate and a RCVS and European Specialist in Veterinary Dermatology. After completing her residency training at the University of Liverpool, she worked in private referral practice for Guide Dogs as part of UK VetDerm, Davies Veterinary Specialists and Calder Vets. She returned to the University of Liverpool in 2014 and is currently in post as Senior Lecturer in Veterinary Dermatology. She is interested in all areas of dermatology, in particular chronic otitis and feline dermatology.



# Our speakers

## Richard Byrne

**BVetMed MRCVS**

Richard Byrne is a Royal Veterinary College graduate and Director at West Bar Veterinary Hospital, Banbury in Oxfordshire. Richard spends most of his time involved in the clinical work of a busy first opinion mixed practice. Richard has a keen interest in using technology in first opinion practice to improve clinical outcomes and processes, improve client care and improve the quality of the work environment for staff.



## Richard Casey

**MBA AssocCIPD**

Richard Casey is a charity veterinary professional and works as Clinical Development Manager at Blue Cross, as well as a Director of the Veterinary Management Group. His areas of expertise include service innovation and people development.



## David Charles

David Charles is a final year student at Bristol Vet School and Senior Vice President of the Association of Veterinary Students. Prior to attending Bristol, he studied biology at the University of Birmingham. His presidential year saw the launch of the AVS EMS Grants, the inaugural EMS Experience survey and the first student led session at London Vet Show. David is passionate about improving the student experience and accessibility in vet schools and on placements for students of all backgrounds. For the last 5 years he has worked either full or part time to help fund his veterinary studies and associated expenses.



## Sylvie Chastant

**DVM PhD Habil DipECAR**

Sylvie Chastant is a French vet, whose passions are teaching and applied research in the field of reproduction. She developed research on canine neonatology and paediatrics, within a dynamic team called Neocare (Toulouse National Vet School, Toulouse, France), dedicated to reproduction, neonatology and kennel/cattery medicine with special interests in colostrum and milk, birth weight, and alert criteria to decrease the risk of mortality in puppies and kittens.



## John Chitty

**BVetMed CertZooMed MRCVS**

John Chitty is a CVS Advanced Practitioner in Zoological Medicine. John qualified from the Royal Veterinary College in 1990 and gained his RCVS Certificate in Zoological Medicine in 2000. John Co-Directs a small animal/exotics practice in Andover, Hampshire with a 100% avian/exotics/small mammal caseload of both referral and first opinion patients. John is consultant to seven zoological collections, a commercial laboratory and the Great Bustard Reintroduction project as well as Co-editor of two texts



on avian medicine, one on rabbit surgery and co-author of a textbook of tortoise medicine. John is the author of various book chapters and papers on a range of species, Vice-President of the European Association of Avian Veterinarians, and Senior Vice President of the British Small Animal Veterinary Association.

## Peter Cockcroft

**BA MA MSc MBA Vet.MB DVM&S DCHP  
DipECBHM FHEA MRCVS**

Peter Cockcroft is Professor of Veterinary Education within the School of Veterinary Medicine at the University of Surrey, where he is responsible for the design, delivery and development of the veterinary curriculum. With Mark Holmes, he co-authored the Handbook of Evidence-Based Veterinary Medicine and the Handbook of Clinical Veterinary Research. Peter is the Editor in Chief of RCVS Knowledge's journal Veterinary Evidence.



## Elizabeth Cox

**CertSAN RVN**

Elizabeth Cox works for Independent Vetcare as Veterinary Project Manager, is also the Senior Vice Chair of RCVS Veterinary Nurses Council and an appointed member of the RCVS council. She also Co-Chairs the RCVS and BVNA Veterinary Nurses Future Project. Having worked within a wide range and style of practices over the years, Elizabeth is passionate about veterinary nursing with a strong focus on the future and direction of the profession. With the rapid changes and advances in the industry, she is keen that nurses develop their own career and the profession as a whole.



## Thomas Cox

**BVSc CertAVP(GSAS) MRCVS**

Thomas Cox is a graduate of Liverpool University, qualifying in 2012, he spent three years in first opinion practice before completing rotating and surgical internships. He is now in his final year of a surgical residency at the Small Animal Teaching Hospital, Liverpool. He has a keen interest in all areas of small animal surgery.



## Carolyn Crowe

**BVetMed(Hons) BSc(Hons) MSc Dip Coaching  
Dip Stress Management and Wellbeing MRCVS**

Carolyn Crowe is an experienced equine vet, an award winning personal performance coach, mentor, international speaker, researcher and lecturer. Carolyn has a Master's degree in Workplace Health and Wellbeing and continues to do research in veterinary team health, wellbeing, performance and engagement. She is a master trainer in DISC behavioural profiling, a CPCAB trainer in Stress management and Wellbeing, a certified trainer in Resilience, a Mental Health First Aider and an Honorary Lecturer of the University of Liverpool. Carolyn is a training consultant at VDS Training.





## Laura Cuddy

**MVB MS DipACVS-SA DipECVS DipACVSMR  
DipECVSMR MRCVS**

Laura Cuddy is a graduate of University College Dublin. She is an American, European, RCVS and VCI Specialist in Small Animal Surgery and an American and European Specialist in Veterinary Sports Medicine and Rehabilitation. Laura is Director of Veterinary Specialists Ireland. She has a keen interest in all aspects of orthopaedic, soft tissue, neurologic and oncologic surgery, specifically minimally-invasive techniques, traumatology and rehabilitation of the postoperative patient. Her research interests include orthopaedic biomechanics, as well as teaching and proficiency assessment in minimally-invasive procedures.



## Stacey Davidson

Stacey Davidson is Champion of Culture and Community at The Ralph Veterinary Referral Centre – a role which combines her two greatest passions; communications and people. She is a true advocate and champion of the far-reaching effects that a positive organisational culture can have on individuals and teams. She also believes that at its heart, great communication is about creating an authentic story, told in a genuine way, with simplicity and purpose.



## Charlotte Dawson

**B VetMed MVetMed PGCertVetEd FHEA  
DipECVO MRCVS**

Charlotte Dawson graduated from the RVC in 2009, and after a year in general small animal practice she went on to complete two rotating internships. The first at a private referral practice and the second at the RVC. Having also undertaken specialist training in the RVC's Ophthalmology Service, she is now Lecturer in Veterinary Ophthalmology and head of the service.



## Rachel Dean

**BVMS PhD MSc(EBHC) DSAM(Fel) SFHEA  
MRCVS**

Rachel Dean, a graduate from University of Glasgow, has worked in mixed, dairy and small animal general practice. She holds the RCVS Diploma in Feline Medicine, has a PhD in epidemiology and an MSc in Evidence-based Healthcare. Rachel is currently the Director of Clinical Research and Excellence in Practice for Vet Partners, the inaugural chair of the Association of Charity Vets and the chief editor of the BSAVA Manual of Shelter Medicine.



## Steven De Decker

**DVM PhD DipECVN MVetMed PGCertVetEd  
FHEA MRCVS**

Steven De Decker graduated from Ghent University in Belgium. After graduation, he performed a rotating internship there and undertook a PhD studying 'wobbler syndrome' in dogs. This was followed by a Residency in Neurology and



Neurosurgery at the Royal Veterinary College. He is Senior Lecturer and the Head of Service of the neurology and neurosurgery team at the Royal Veterinary College. Although he is interested in all aspects of veterinary neurology, most of his research and publications focus on spinal disorders and neurosurgery.

## Margaret Mary Devaney

Margaret Mary Devaney was invited to join the RCVS Knowledge Quality Improvement Advisory Board in 2018. She brings with her the unique experience and perspective of an NHS improver. As well as being a registered nurse, she has undertaken leadership roles such as Head of Patient Safety at the Royal Free London NHS Foundation Trust and currently as Assistant Director for Quality & Risk at East and North Hertfordshire NHS Trust. Margaret Mary has experience as a Quality Improvement Advisor with the Academic Health Science Network UCL Partners and through in-depth studying with the Institute for Healthcare Improvement (IHI) Improvement Advisor Programme.



## Simon Doherty

**BVMS CertAqV MRCVS MRQA CBiol FRSB**

Simon is the president of the British Veterinary Association and a Senior Lecturer (Education) in Animal Health & Welfare at the Institute of Global Food Security, Queen's University Belfast. He is a trustee of the BVA Animal Welfare Foundation and of international livestock development charity, Send a Cow. Through his own business, Blackwater Consultancy Ltd, Simon delivers mentorship in business development for innovative start-up and spin-out companies working in the agri-tech & agri-food sectors, and he was appointed as a GlobalScot by Scottish Development International during 2018.



## Julie Dugmore

**RVN**

Julie Dugmore qualified as a veterinary nurse in 1987 after spending her training years in small animal practice. Her keen interest in student training led her to take a teaching position in 2000 and since leaving full time practice she has kept her clinical skills up to date. Julie's position with the Royal College of Veterinary Surgeons has been varied; starting in 2002 as an external verifier and progressing through the ranks to become the Director of Veterinary Nursing responsible for eight members of staff working to support the Veterinary Nurse Council in the college's regulatory remit.



## Florent Duplan

**DVM MRCVS**

Florent Duplan is Resident in Small Animal Internal Medicine at Langford Vets, University of Bristol. In 2015, he graduated from Alfort Veterinary School in France and performed a small animal rotating internship in Canada, at the University of Prince Edward Island.





# Our speakers

## Sarah Egleston

**RVN VTS(ECC)**

Sarah Egleston graduated from the University College Dublin in 2010, after which she worked in general practice before moving to a large emergency referral hospital in central London, where she was the transfusion nurse and clinical lead. In 2017, Sarah became a member of the Academy of Veterinary Emergency and Critical Care Technicians, when she obtained her VTS (ECC) qualification. Sarah is currently an ECC nurse at the QMHA RVC.



## Gary England

**BVetMed PhD DVetMed DipVR DipVRep  
DipECAR DipACT PFHEA FRCVS**

Gary England is Professor of Comparative Veterinary Reproduction at the School of Veterinary Medicine and Science, University of Nottingham. He gained a PhD in canine reproduction, is a Diplomate of the European College of Animal Reproduction and the American College of Theriogenologists, and he holds the RCVS Diploma in Veterinary Reproduction.



## Brian Faulkner

**BSc(Hons) BVM&S CertGP(SAM) CertGP(BPS)  
MBA MSc(Psych) MRCVS**

Brian Faulkner is a clinician, veterinary business consultant and confidence coach. Brian has set up, developed and exited 4 veterinary practices. He is the creator of Colourful Consultation.com and founder of The British Veterinary Receptionist Association. He is a SPVS past president.



## Joe Fenn

**BVetMed MVetMed DipECVN FHEA MRCVS**

Joe Fenn graduated from the Royal Veterinary College in 2009 and spent some time in general practice in Derbyshire. He then returned to the RVC to complete a rotating internship and residency in veterinary neurology and neurosurgery. Following completion of his residency, Joe stayed at the RVC as staff clinician, and in 2017 was appointed as a Lecturer in Veterinary Neurology and Neurosurgery. Joe is a European and RCVS Recognised Specialist in Veterinary Neurology. He is interested in all aspects of veterinary neurology and neurosurgery, including the management of acute spinal cord injury and advanced neurosurgery.



## Elena Fenollosa-Romero

**DVM CertVOphthal MRCVS**

Elena Fenollosa-Romero is a third year ECVO resident at Dick White Referrals. She enjoys all aspects of Ophthalmology but mainly corneal and intraocular surgery.



## JD Foster

**VMD DACVIM(SAIM)**

JD Foster graduated from the University of Pennsylvania. After spending a year in private practice general medicine, he completed an internship followed by a residency in small animal internal medicine at the University of Wisconsin. JD is now a staff veterinarian at the Friendship Hospital for Animals in Washington DC. There, he runs the only extracorporeal blood purification service in the region. His research interests include glomerulonephritis, acute kidney injury, novel usage of extracorporeal blood purification, and biomarkers of renal injury. JD is the current president of the American Society of Veterinary Nephrology and Urology. He has published numerous textbook chapters, peer reviewed research and review articles, and has spoken internationally on many topics within renal and urinary disease.



## Shakira Free Miles

**RVN Bsc**

Shakira Free Miles qualified in 2009 and has worked in a wide variety of clinics all over the world. Shakira is a passionate and active RVN focusing on animal welfare and has a strong voice within the profession on breed specific laws and animal cruelty.



## Isuru Gajanayake

**BVSc CertSAM DipACVIM DipECVIM-CA  
DipACVN MRCVS**

Isuru Gajanayake is an American, European and RCVS Specialist in Small Animal Internal Medicine, and an American Specialist in Small Animal Nutrition. Isuru is the Head of Internal Medicine at Willows Veterinary Centre and Referral Service, where he works as a specialist in internal medicine and clinical nutrition.



## Alex German

**BVSc PhD CertSAM DipECVIM-CA SFHEA  
FRCVS**

Alex German holds the position of Royal Canin Professor of Small Animal Medicine at the University of Liverpool. He is a 1994 graduate of the University of Bristol and, after spending two years in mixed practice, returned to Bristol to undertake a PhD in mucosal immunology, and then a residency in small animal internal medicine. He is a Diplomate of the European College of Veterinary Internal Medicine, a RCVS Recognised Specialist in Internal Medicine, and a Senior Fellow of the Higher Education Academy. His clinical and research interests include comparative obesity biology, ageing, preventing chronic disease, gastroenterology and evidence-based veterinary medicine. For 14 years, he has run the Royal Canin Weight Management Clinic at the University of Liverpool. This specialist clinic aims to improve the quality of life of all overweight pets through clinical excellence, research and education.



## Sonya Gordon

**DipACVIM Cardiology**

Sonya Gordon is a graduate of the Ontario Veterinary College (Canada) where she also completed her cardiology residency training and advanced degree in veterinary cardiology. Sonya has been on faculty at Texas A&M University since 1998. She teaches in all years of the DVM program and is the cardiology residency program director. Sonya practices medicine 30%–50% of the time, which facilitates her research interests that are realized in large part through involvement in multicentre collaborative clinical trials and collaborative translational research. These opportunities, coupled with her involvement in multicentre international studies, have provided her with a global perspective with respect to veterinary cardiology.



## Richard Guest

**MA (Hons) CEO Morgan Frey, Telemedicine Consultancy**

Richard Guest graduated from Oxford University and has driven innovation across a number of industries. Most recently Richard launched the NHS GP at hand service with Babylon health, saving patients time and taking pressure off the rest of the NHS.



## Eilidh Gunn

**BVMS DVMS DipECVIM-CA MRCVS**

Eilidh Gunn is a graduate of the University of Glasgow and, following a residency at the University College Dublin, obtained her ECVIM diploma in small animal internal medicine. Eilidh is a clinician at North Downs Specialist Referrals and is interested in all areas of internal medicine.



## Chris Gush

**BSc MSc**

Chris Gush is the Executive Director of RCVS Knowledge, which aims to advance the quality of veterinary care for the benefit of animals, the public and society. Chris began his career as a microbiologist. Having left the laboratory, a move to the Department of Health saw him co-develop the Showcase Hospitals Programme. Later, at the Health Protection Agency, Chris managed investigations into microbiology testing leading to improved standards. In his previous role as Assistant Director of Clinical Innovation and Research at the Royal College of General Practitioners, Chris led on the development of resources to help improve the quality of patient care.



## Peter Haseler

**BVetMed MRCVS**

Peter Haseler is a Royal Veterinary College graduate. Pete works as a first opinion and referral vet at Acorn Veterinary Centre, Studley. He has a keen interest in veterinary dentistry, is a past President of the British Veterinary Dental association and is the Treasurer of the European Veterinary Dental society.



## Rachel Hattersley

**BVetMed(Hons) CertSAS DECVS MRCVS**

Rachel Hattersley is a Royal Veterinary College graduate and an RCVS and EBVS Specialist in Small Animal Surgery. Rachel is a member of the soft tissue surgery team at Dick White Referrals. She has a keen interest in all areas of soft tissue surgery but her specific areas of interest include brachycephalic obstructive airway syndrome, feline nephroureterolithiasis and surgical oncology.



## Philippe Hennet

**DV DipAVDC DipEVDC**

Philippe Hennet is an American, European and French Specialist in Dentistry and Oral Surgery. Philippe works at ADVETIA Veterinary Referral Hospital and is Head of Dentistry, Oral and Maxillofacial Surgery.



## Michael Herrtage

**MA BVSc DVSc DVR DVD DipSAM FRCVS DipECVIM DipECVDI RCVS and European Specialist in Small Animal Medicine**

Mike Herrtage graduated from the Liverpool University and was until recently Professor of Small Animal Medicine at the University of Cambridge and Dean of the Cambridge Veterinary School. He was in charge of the small animal medicine and diagnostic imaging services at the Queen's Veterinary School Hospital. His clinical responsibilities include all aspects of small animal medicine and diagnostic imaging, but he has a particular interest in endocrine and metabolic disorders.



## Paul Higgs

**MA VetMB CertSAM DipECVIM-CA MRCVS**

Paul Higgs qualified from the University of Cambridge in 2006. He completed a residency in internal medicine at the University of Bristol and became a Diplomate of the European College of Veterinary Internal Medicine in 2014. Since then he has worked in private referral practice and is currently part of the internal medicine team at Highcroft Referrals, Bristol.



## Georgina Hills

**RVN CVPM**

Georgina Hills is a Veterinary Management Group Director and works as an Operations Manager for Independent Vetcare, previously having worked as an RVN and practice manager. Georgina sits on the VMG committee for the Certificate in Veterinary Practice Management (CVPM) and has a keen interest in promoting the benefits of non-clinical CPD and management training for all members of the team, including the leaders, to improve practice life.



# Our speakers

## Jo Hinde

**RVN**

Jo Hinde is a Registered Veterinary Nurse with a special interest in rabbit medicine. Jo is a director of LagoLearn which provides rabbit specific CPD to veterinary professionals in the UK and internationally. She is also a BVNA Council member and has won awards for her dedication to animal welfare.



## Delphine Holopherne-Doran

**DVM MSc PhD DipECVAA AFHEA MRCVS**

Delphine Holopherne-Doran is an EBVS Specialist in Veterinary Anaesthesia and Analgesia. She works as a clinical anaesthetist at Highcroft Veterinary Referrals; she has a keen interest in all areas of anaesthesia and analgesia.



## Paula Hotston Moore

**Med RVN**

Paula Hotston Moore is a Registered Veterinary Nurse, working at the University of Bristol for 13 years up until December 2018. Paula has worked in veterinary nurse education for a number of years. Paula was Senior Tutor for the veterinary nursing courses and had responsibility for the pastoral support of undergraduate students.



## Dawn Howard

**Chief Executive of NOAH**

Dawn Howard, prior to joining NOAH in 2014 was based in Brussels and spent a number of years representing UK agriculture in the office of the UK National Farmers Union where her responsibilities included animal health and welfare. She later headed up the European body for farm animal breeders, EFFAB. Dawn previously worked in Defra's Animal Health and Welfare policy unit in Westminster and prior to that both Plant Health and pesticides policy in York, originally joining as a field-based inspector. Whilst originally qualified as a botanist, Dawn has a passion for raising animal health and welfare standards.



## Susan Howarth

**BSc(Hons) DipAVN(Surg) DipAVN(Med) CertEd FHEA RVN**

Susan Howarth is the Programme Manager of Veterinary Nursing courses at Harper Adams University and sits on the RCVS Veterinary Nursing Education Committee and Veterinary Nurse Council. She has an interest in veterinary nurse education, in particular post professional education.



## Andrea Jeffery

**RVN MSc DipAVN(Surg) CertEd FHEA**

Andrea Jeffery is a Veterinary Nurse Educator and has worked in both further education and now higher education for the past



twenty years. Andrea is Programme Director for the undergraduate veterinary nursing programmes at the University of Bristol and is currently Chair of the VN Education Committee at the RCVS. She has a keen interest in patient care and client compliance as well as improving professional practice.

## Thom Jenkins

**MA VetMB MRCVS**

Thom is Founder and CEO of Gula, a mobile-first veterinary telemedicine platform enabling veterinary clinics to offer video consultations to pet owners. Thom previously served as the Chief Operating Officer of multi-site veterinary groups in both Europe and Asia. Thom serves as Chair of VetForum USA, UK and APAC events, is Non Executive Director at Recruit4vets and is an advisor to YLD, one of London's fastest growing software engineering consultancies working with brands such as The Economist, Trainline and Thomas Cook.



## Georga Karbe

**DVM PhD DACVS-SA MRCVS**

Georga Karbe graduated from the Freie University Berlin, Germany after which she pursued specialist surgical training in the United States. She spent time at Colorado State University and the University of Pennsylvania, where she completed a research fellowship as well as surgical internship and residency. Georga is a Diplomate of the American College of Veterinary Surgeons and is currently working as a soft tissue consultant at Dick White Referrals. She has a strong interest in all aspects of soft tissue surgery, particularly minimally invasive surgery and reconstructive surgery.



## Aarti Kathrani

**B VetMed(Hons) PhD DACVIM(SAIM) DACVN MRCVS**

Aarti Kathrani graduated from the Royal Veterinary College in 2006 before completing her rotating small animal medicine and surgery internship at the Queen Mother Hospital for Animals, RVC, in 2007 and her PhD in canine inflammatory bowel disease at the RVC in 2011. Aarti then completed a three-year residency program in small animal internal medicine at Cornell University in 2014 and is a diplomate of the American College of Veterinary Internal Medicine. She also completed a two-year small animal clinical nutrition residency program at the University of California-Davis in 2016. She is a diplomate of the American College of Veterinary Nutrition. Aarti works at the RVC as a senior lecturer in small animal internal medicine.



## Sophie Keyte

**BVMS(Hons) MVetMed(Dist) FHEA DACVIM MRCVS**

Sophie Keyte is a Glasgow University graduate and an American and RCVS Specialist in Small Animal Internal Medicine. She enjoys



all aspects of internal medicine, however her main areas of interest are endocrinology and infectious disease. During her residency she was a member of the "Feline Acromegaly Team" at the Royal Veterinary College. Sophie is currently a Clinical Teaching Fellow at the University of Bristol and leads the canine hypophysectomy service, alongside the Neurology and Emergency and Critical Care team, at Langford Veterinary Services.

## Richard Killen

**BVSc MRCVS**

Richard Killen qualified from Bristol University and for many years was partner at the Highcroft Vet Group in Bristol. Since 2016 he has been the Director of Clinical Services for CVS Group, his responsibilities include helping maintain the clinical and practice standards within CVS practices. Richard is also a senior assessor for the RCVS PSS.



## Jennifer Kinns

**VetMB DipECVDI DACVR MRCVS**

Jennifer Kinns is a Cambridge Veterinary School graduate and an American, European and RCVS Specialist in Diagnostic Imaging. Jennifer works as a radiology consultant and medical manager with Idexx Telemedicine and is exam director for the European College of Veterinary Diagnostic Imaging. She has a particular interest in teaching radiographic interpretation to general and emergency practitioners.



## Chris Laurence

**MBE QVRM TD BVSc FRCVS**

Chris Laurence qualified as a vet from Bristol in 1968 and worked in mainly small animal practice until 1998. Chris was subsequently Chief Veterinary Officer at the RSPCA and Veterinary Director of Dogs Trust. He retired in August 2011. He was awarded the MBE for services to animal welfare in 2007 and granted Fellowship of the Royal College of Veterinary Surgeons in 2017.

Chris is currently Chairman of the Canine and Feline Sector Group and Chairman of the Animal Welfare Foundation and the British Veterinary Behaviour Association. He also works for other charities



## Richard LeCouteur

**BVSc PhD DipACVIM(Neurology) DipECVN**

Richard LeCouteur is a graduate of The University of Sydney, and a Diplomate of the American College of Veterinary Internal Medicine (Neurology) and the European College of Veterinary Neurology (ECVN). Currently Rick is a Professor Emeritus of Neurology and Neurosurgery at The University of California, Davis.



## Dan Lewis

**MA VetMB CertVA DipACVECC DipECVECC MRCVS**

Dan Lewis is a Cambridge graduate and an American, European and RCVS Specialist in Small Animal Emergency & Critical Care. Dan is national clinical lead in ECC for Vets Now and is based in their Glasgow referral hospital. He is interested in all aspects of emergency & critical care, but particularly in the treatment of sepsis and the use of blood products in the critically ill patient.



## Philip Lhermette

**BSc (Hons) CBiol FRSB BVetMed FRCVS**

Philip Lhermette is the principal and founder of Elands Veterinary Clinic, near Sevenoaks in Kent. After completing an honours degree in animal physiology at the University of Nottingham in 1977, Philip went on to complete his degree in veterinary medicine at the Royal Veterinary College, London, in 1982. Following four years in mixed practice in Surrey Philip moved to Kent to establish his own practice which moved to new purpose-built premises in 2010.

Philip has a particular interest in surgery – and more specifically, minimally invasive (keyhole) surgery using both rigid and flexible endoscopes. Philip trained with human minimally invasive surgeons in the UK and veterinary endoscopists in the USA. Having practised rigid endoscopy since 1995, Philip has extensive experience in endoscopy and endosurgery and has run a referral service since 2001. He pioneered laparoscopic bitch spays and laser endosurgery in veterinary medicine in the UK, is author and editor of the BSAVA Manual of Canine and Feline Endoscopy and Endosurgery and has contributed to numerous other publications and lectures extensively in minimally invasive techniques throughout the UK, Europe and Asia. In 2011 Philip received the BSAVA Simon Award for outstanding contributions in the field of veterinary surgery. In 2016 he was awarded Fellowship of the Royal College of Veterinary Surgeons for meritorious contributions to clinical practice and in 2017 he was awarded Fellowship of the Royal Society of Biology. He is an Official Veterinary Surgeon (OV) currently on the following panels: ES, EX, SX, CA.



## Francisco Llabrés-Díaz

**DVR DipECVDI MRCVS**

Francisco Llabrés-Díaz has been working in the field of referral small animal diagnostic imaging for 20 years. He is an RCVS Specialist in Veterinary Diagnostic Imaging, holding the RCVS and ECVDI Diplomas. Francisco has worked at different referral centres in the UK and has been Chair of the British and Irish Division of the European Association of Veterinary Diagnostic Imaging and the East Anglia Region of BSAVA.





# Our speakers

## Anette Loeffler

**DrMedVet PhD DVD DipECVD MRCVS**

Anette Loeffler graduated from Ludwig-Maximilians-University Munich, worked in mixed practice in Cumbria for six years and is now assistant professor in veterinary dermatology at the Royal Veterinary College, involved in clinical work, teaching and research. She is a European and RCVS Specialist in Veterinary Dermatology and has a keen research interest in bacterial skin diseases, antimicrobial resistance and zoonotic transmission of MRSA and MRSP.



## Christine Magrath

**BVMS HonFRCVS**

Christine Magrath was appointed by the VDS in 1999 to initiate and develop a programme which specifically deals with every day communication with clients and addressing difficult situations. The programme has had an impact at practice level and on undergraduate training, and in light of this Christine was awarded an Honorary Fellowship of the Royal College in 2009 and presented with the Chiron award from the BVA in 2010. Christine is recognised as a leader in this field and has co-authored books on the subject. She is a past President and Treasurer of SPVS and was a partner for 12 of her 17 years in practice.



## Christoph Mans

**DrMedVet DipACZM DipECZM(ZHM)**

Christoph Mans is a native of Germany and received his veterinary degree from the University of Leipzig (Germany). He completed an internship in Avian and Exotic Animal Medicine at the Ontario Veterinary College (Canada) followed by employment in private practice in Hong Kong. He then completed a 3-year-residency in zoological medicine at the University of Wisconsin-Madison, the Milwaukee County Zoo and the International Crane Foundation. He is currently a clinical associate professor of zoological medicine at the University of Wisconsin-Madison, USA.



## Stephen May

**MA VetMB PhD DVR DEO FRCVS DipECVS FHEA**

Stephen May is Professor of Education and Senior Vice-Principal at the Royal Veterinary College, and Senior Vice-President of the Royal College of Veterinary Surgeons, currently chairing its Graduate Outcomes Working Group. He is interested in professional identity and capability and learning that supports this, including communication skills, leadership and team-working, scientific, clinical and ethical reasoning, and professionalism. He pioneered new approaches to teaching, learning and assessment, and has extensive experience of curricular development. His research focuses on the scholarship of primary care, reflective practice and learning, professional development and assessment methods.



## Anne McBride

**PHD**

Anne McBride's degree was in Psychology and her PhD in animal behaviour. She has been a practising clinical animal behaviourist for over 30 years. She has taught about owner psychology, counselling and listening skills to behaviour counsellors and animal training instructors for 20+ years. Understanding and interacting with owners is core to the success of any treatment or programme aimed at improving animal welfare in any context.



## Fiona McDowall

**PGDipVN Oncology PGCertTLHE CertAAB DipAVN DipCVN RVN**

Fiona McDowall is the Senior Oncology Nurse at the Royal Dick School of Veterinary Studies, Edinburgh. Fiona is currently studying towards a Master's Degree in Veterinary Nursing Oncology and has a keen interest in medical oncology and client support techniques.



## Matt McMillan

**BVM&S DipECVAA MRCVS**

Matt McMillan is the Principal Clinical Anaesthetist at Cambridge Vet School. His interests are patient safety, error, ethics and education.



## Pam Mosedale

**BVetMed MRCVS**

Pam Mosedale is a Lead Assessor for the RCVS Practice Standards Scheme. She is also an SQP assessor for AMTRA, organises CPD for SQPs, edits the BSAVA Guide to the Use of Veterinary Medicines and organises the BSAVA Dispensing Course. Pam is a member of RCVS Knowledge's Quality Improvement Board and has a keen interest in all aspects of clinical governance and quality improvement in practice.



## Dave Nicol

**BVMS CertMgmt MRCVS**

Dave Nicol is a veterinary marketing, performance management and leadership expert. He has written three books, most recently 'So You're A Vet...Now What?', and publishes the weekly Freewheelin' Vet Biz Q&A Show on YouTube. Plus, he hosts Blunt Dissection Podcast, a monthly conversation about success with the rock stars of veterinary medicine (which receives more than 60,000 plays per year), and is the founder of VetX Graduate, an independent teaching, mentoring and networking community helping vets thrive in practice (not just survive), by teaching essential non-clinical skills. In his spare time, he helps to run Roundwood Vets, a small, independent veterinary practice in London. You can access all of his content (the majority of which is free) and get in touch at [www.drdavenicol.com](http://www.drdavenicol.com).



## Louise O'Dwyer

**MBA BSc(Hons) VTS(Anaesthesia/Analgesia & ECC) DipAVN(Medical & Surgical) RVN**

Louise O'Dwyer currently works as Clinical Support Manager for Vets Now and is based at their 24/7 Emergency and Specialty Hospital in Manchester. Louise gained her Diploma in Advanced Veterinary Nursing (Surgical) in 2004 followed by her Diploma in Advanced Veterinary Nursing (Medical) in 2007, Veterinary Technician Specialist (Emergency and Critical Care) in 2011 and Veterinary Technician Specialist (Anaesthesia) in 2014. Louise has contributed to over 45 books, journal articles and book chapters, and lectures regularly worldwide. In 2016, she was the recipient of the prestigious Bruce Vivash Jones Veterinary Nurse Golden Jubilee Award by the RCVS for exceptional contribution to veterinary nursing. Louise became the President of the Academy of Veterinary Emergency and Critical Care Technicians in September 2018.



## Ron Ofri

**DVM PhD DipECVO**

Ron Ofri was a member of the charter class of the Koret School of Veterinary Medicine, Hebrew University of Jerusalem, Israel, and has a PhD from the University of Florida. Ron is a European Specialist in Veterinary Ophthalmology, and a Professor in his alma mater. He is winner of numerous Teacher of the Year awards, a popular international speaker, author of more than 80 refereed papers and co-author of the popular textbook Slatter's Fundamentals of Veterinary Ophthalmology (4th and 5th editions). In 2002-2005 he served as President of the European Society of Veterinary Ophthalmology.



## Catherine Oxtoby

**BVSc PhD MRCVS**

Catherine Oxtoby qualified from Bristol Vet School in 2000 and worked as a small animal and equine vet in the South West for 13 years. In July 2017, she completed a PhD in Patient Safety at Nottingham Vet School, co supervised by the School of Psychology. Catherine's research investigated the causes of errors in veterinary practice, the effect of organisational culture, and the adaptation of an inter-professional teamwork training programme from human medicine for use in veterinary practice. Catherine presently works for the Veterinary Defence Society, applying human factors principles to develop system strategies and training programmes to help vets and veterinary practices mitigate errors and improve patient outcomes.



## Gillian Page

**BSc RVN Cert(B&PS)**

Gillian Page was one of the first RVNs in the UK to own a veterinary practice and was co-founder of Ayrton Veterinary Hospital. Opening in 1999 and progressing to a purpose-built Veterinary Hospital in 2006. As Centre Manager for The College of Animal Welfare, she was



involved as Deputy Programme Leader in the setting up of Scotland's first BSc (Hons) Degree in Veterinary Nursing. Gillian's interest is in Leadership, practice culture, clinical workflow and standards; believing that structure and standardisation in practice can help achieve quality assurance and professional confidence. She obtained the European School of Veterinary Post Graduate Studies (ESVPS) Certificate in Business & Professional Skills (Cert B&PS) in 2011. Gillian is currently the Junior Vice President of the Veterinary Management Group (VMG).

## Gina Parkes

**DipAVN(small animal) PG Cert VetEd FHEA**

Gina Parkes qualified in Northern Ireland in 2008 and currently works at the Royal Veterinary College's Queen Mother Hospital for Animals as the Head Medicine Nurse. This year she completed her Postgraduate Certificate in Veterinary Education and has a keen interest in evidence based veterinary nursing.



## Sue Paterson

**MA VetMB DVD DipECVD FRCVS**

Sue Paterson is a Cambridge graduate and a RCVS and European Specialist in Veterinary Dermatology. She is a Fellow of the RCVS through meritorious contribution to clinical practice. She is the Senior Vice President of the European Society of Veterinary Dermatology and chairs the Education Board at the World Association of Veterinary Dermatology. Sue is a Director of Virtual Vet Derms, a Dermatology Telemedicine Service. She is incoming President of BSAVA.



## Karen Perry

**BVM&S CertSAS DipECVS PGDipVetEd FHEA MRCVS**

Karen Perry graduated from The Royal (Dick) School of Veterinary Studies, Edinburgh in 2005. Following a short period in mixed practice, she completed an internship at Fitzpatrick Referrals prior to undertaking a residency in small animal surgery back at the R(D)SVS. Following achievement of ECVS status in 2011, she joined the Royal Veterinary College as a lecturer in small animal orthopaedics. After four years there she moved to Michigan State University where she is currently an Assistant Professor in Small Animal Orthopaedics. Her main research interests are feline orthopaedics, limb deformities associated with medial patellar luxation and traumatology.



## Rachel Pickles

**DipAVN(Medical) RVN**

Rachel Pickles has her Diploma in Advanced Medical Nursing. Rachel is one of the head nurses at Anderson Moores Veterinary Specialists. Rachel was one of two nurses that helped set up Anderson Moores when it opened in August 2006. She is particularly interested in transfusion medicine and endocrinology.





# Our speakers

## Laura Playforth

**BVM&S PGDipAdvHCP(Open) MRCVS**

Laura Playforth graduated from the Royal (Dick) School of Veterinary Studies and currently works as Head of Veterinary Standards for Vets Now. Laura has a keen interest in quality improvement and is currently completing a Masters in Advancing Healthcare Practice.



## Caryn Plummer

**DVM DACVO**

Caryn Plummer is a graduate of the University of Florida College of Veterinary Medicine (Go Gators!). Following veterinary school, she completed an internship in small animal medicine and surgery at Michigan State University College of Veterinary Medicine followed by a residency in comparative ophthalmology at the University of Florida. She is a Diplomate of the American College of Veterinary Ophthalmologists (2006) and is currently a tenured associate professor at the University of Florida. Her research interests include corneal wound healing and glaucoma. She has lectured extensively both in the USA and abroad on many topics associated with clinical veterinary ophthalmology and animal models of ophthalmic disease, especially glaucoma. She is also a charter member of and currently serves as the secretary/treasurer for the International Equine Ophthalmology Consortium.



## Paul Pollard

**MVB Cert AVP Cert Vet Ed FHEA MRCVS**

Paul Pollard graduated from Dublin in 1990 and has worked in mainly first opinion practice. He is the head vet at the RVC first opinion hospital in Camden where he teaches final year students day one skills. His interests include cardiology and veterinary education.



## Gerry Polton

**MA VetMB MSc(Clin Onc) DipECVIM-CA(Oncology) MRCVS**

Gerry Polton graduated from Cambridge University. He is an EBVS Specialist in Oncology and an RCVS Recognised Specialist in Veterinary Oncology. Gerry is the Clinical Director of Oncology at North Downs Specialist Referrals.



## Denise Prisk

**VTSA(Anaesthesia & Analgesia) DipAVN(Surgical) LTCL LCGI RVN**

Denise Prisk has had a long career in small, mixed and referral practice. She has taught veterinary nursing for many years and has been involved in the RCVS exam system for over 20 years. Denise has lectured extensively on all aspects of anaesthesia. She has been a contributing author to anaesthesia and general nursing textbooks and has published journal articles. Denise works at Anderson Moores Veterinary Specialists part time as well as running her



own in-practice training and CPD business and is currently the exam Chair for the Academy of Veterinary Technicians in Anaesthesia and Analgesia.

## Professor the Lord Trees

Lord Trees qualified as a veterinarian in 1969 and worked in general practice, industry and, for most of his career, academia. At the University of Liverpool, he was Professor of Veterinary Parasitology (from 1994) and Dean 2001–2008. He was RCVS President 2009–2010 and is currently Chair of the Moredun Research Institute, Veterinary Editor in Chief of the Vet Record and In Practice, and an Honorary Fellow of the Royal Society of Edinburgh. In 2012 he was appointed a Crossbench Peer in the House of Lords, and has been a member of the EU Select Committee and its Sub-Committee on Energy and Environment.



## Ian Ramsey

**BVSc PhD DSAM DipECVIM-CA FHEA FRCVS**

Ian Ramsey is Professor of Small Animal Medicine at Glasgow University. He has lectured and published in many aspects of small animal medicine but his main interest is in endocrinology. He is the editor-in-chief of the BSAVA Canine and Feline Formulary and was awarded the BSAVA Woodrow Award for contributions to small animal medicine in 2015.



## Matt Read

**DVM MVSc DACVAA**

Matt Read graduated from the Western College of Veterinary Medicine in Canada in 1998. He completed a residency in veterinary anaesthesiology at the WCVI and became board-certified with the American College of Veterinary Anesthesia and Analgesia in 2002. Matt enjoys sharing his passion and enthusiasm for anaesthesia and pain management with anyone who will listen, and even those who don't! He has delivered over 100 lectures and workshops and is currently preparing the second edition of a text book, Small Animal Regional Anesthesia and Analgesia. Matt works as an anaesthesiologist for MedVet in Columbus, Ohio.



## Nicola Read

**PGCert(Onc) DipAVN(Med) AFHEA RVN**

Nicola Read is the Head Oncology Nurse at the Queen Mother Hospital for Small Animals; together alongside a dedicated team of nurses, residents and specialist veterinarians, Nicola strives towards delivering individualised care for both the patient and client. Nicola has a keen interest in advancing comparative oncology and is an advocate for continued learning through sharing the understandings and experiences of oncological caregivers with the veterinary nursing community.



**Kate Richards****BVM&S DipM MA MRCVS**

Kate Richards graduated from the Dick Vet, spending the next fifteen years in farm animal practice. She moved into industry and then government, firstly as a veterinary advisor before diversifying into communication and policy roles. Kate recently graduated with an MA in Creative and Life Writing, has a portfolio of non-executive directorships and is a member of the RCVS Council and Chair of the Standards Committee.

**Renay Rickard****RVN CVPM**

Renay Rickard is the current Senior Vice President of the Veterinary Management Group. Renay is practice manager and director of Kernow Veterinary Group, a mixed multi-site practice in mid Cornwall. She has a special interest in the career development of Veterinary Nurses.

**Claire Roberts****DipAVN(Surg) PGCertVetAA CertVNECC RVN**

Claire Roberts works part time as part of the theatre team at Northwest Veterinary Specialists where she also chairs the infection control committee and is the owner of SynergyCPD which delivers in house CPD to the veterinary team.

**Alan Robinson****BVSc MRCVS DMS**

Alan Robinson has been a veterinary surgeon in practice for 20+ years, a successful business consultant for 18 years to over 600 practices and a director of Vet Dynamics. His mission is helping independent practice owners improve performance and quality of life in practice. His company, Vet Dynamics, works with independent practices to provide personalized resources for Practice Performance, Business Intelligence, Leadership and Culture, and Team Engagement.

**John Robinson****BDS(London)**

John Robinson qualified as a dentist and worked in general dental (NHS) practice for 6 years. Veterinary dentistry became his full time occupation in 1992. He has extensive experience of treating 1st opinion and specialist (referral) small animal dental cases. He is an external lecturer in dentistry at Cambridge Vet School and University College Dublin. Currently, the main focus of his work is advancing the provision of dentistry in general veterinary practice.

**Jeremy Rose****MA VetMB DipECVN MRCVS**

Jeremy Rose is a Cambridge graduate and a European and RCVS Specialist in Neurology. Jeremy works at Fitzpatrick Referrals and is a senior surgeon in neurology; he has a keen interest in all areas of neurology but particularly stabilisation surgeries.

**Suzanne Rudd****DipAVN(medical) RVN**

Suzanne Rudd started work in a small animal practice in Nottingham before qualifying from the Berkshire College of Agriculture 1999. In 2002 she moved to Bristol to become a feline nurse at the University of Bristol's Feline Centre. In 2004 she gained her advanced medical nursing diploma. Suzanne is now the senior feline nurse at The Feline Centre and is involved in teaching the veterinary and veterinary nursing undergraduates as well as lecturing around the UK on a wide range of feline nursing topics. She is also one of the lectures for the BSAVA Medical Veterinary Nursing Award and part of the nursing editorial board for International Cat Care.

**Miles Russell**

Miles Russell is a director and practice manager of The George Veterinary Group, a large independent practice based in Malmesbury, Wiltshire with four species specific departments. Miles has management responsibility for all non clinical activities of the practice, including finance. He trained with one of the four big accountancy firms before working and becoming a partner in a firm of chartered surveyors. He has been working in the veterinary industry now for 10 years and joined the board of VMG in 2018.

**Linda Ryan****DipAVN(Medical) VTS(Oncology)  
KPA-CTP RVN**

Linda Ryan started her nursing career in general practice, qualifying in 2002. She then spent many years working in specialist clinics at two university referral hospitals. She has attained the Diploma in Advanced Nursing (Medical) and the Veterinary Technician Speciality (Oncology). She is a qualified animal trainer, behaviour practitioner and, in autumn 2018, Linda became a Veterinary Technician Specialist in Behaviour. She is passionate about collaborative care and patient-friendly practice, and regularly teaches various veterinary nursing & behaviour/training topics locally, nationally, internationally & online, & regularly writes for veterinary publications. She continues to study in the field of animal behaviour & welfare.



# Our speakers

## Raquel Salgüero

**DVM MA DipECVDI MRCVS**

Raquel Salgüero is a graduate from the University Complutense of Madrid, Spain. She undertook her residency at the University of Cambridge and has worked as a radiologist in different referral hospitals. Raquel is a European and RCVS Specialist in Diagnostic Imaging. She is Head of the Diagnostic Imaging Department at Hospital Veterinario Puchol in Madrid and is a part-time Assistant Professor at the University Complutense of Madrid. She is interested in all areas of Diagnostic Imaging.



## Paolo Selli

**DMV PhD SpecPACS DipECZM**

Paolo Selli is a diplomate of the European College of Zoological Medicine (Small Mammal and Herpetology) and is the head of the Clinica per Animali Esotici, an exotics-only animal hospital site in Rome. Paolo frequents world-class veterinary structures, courses and conferences. Paolo worked as a clinical professor in the Universities of Padua, Naples and Teramo, transmitting his passion for herpetological medicine to undergraduate students. Beyond daily clinical activity, Paolo strongly supports the application of evidence-based standards for exotic animal medicine in Italy and is the co-author of several books and papers. He is the past-president of the Italian association of exotic animal veterinarians and is currently the Vice President of the Association of Italian Veterinarians.



## Ruth Serlin

**BVetMed Cert VA MRCVS PGCP FHEA**

Ruth Serlin graduated from the Royal Veterinary College and has spent over 25 years working in small animal charity practices. She is now a Lecturer in Veterinary Professionalism at the RVC. Ruth has volunteered her time in a number of outreach projects treating pets owned by homeless people since the '90s and is a founding trustee of Street Vet.



## Holly Smith

**RVN**

Holly Smith is an RVN, has a diploma in advanced surgical nursing and currently works at the Royal Veterinary College, Queen Mother Hospital in the neurology team. She has always had a passion for the rehabilitation and care of neurological patients. Holly has also helped to set up and run the hydrotherapy unit at the Queen Mother Hospital.



## Alex Smithson

**BVM&S BDS(Hons) CertEndodontology MRCVS**

Alex Smithson is a dual-qualified Veterinary Surgeon and human Dental Surgeon. He is Director of Orosurgeon Ltd, providing veterinary dental, oral and maxillofacial referrals. First qualifying as a vet, Alex undertook six years' specialist training in veterinary dentistry, oral and maxillofacial surgery followed by qualifying as a human



Dental Surgeon and gaining the human post-graduate Certificate in Endodontology. He has a keen interest in endodontology (pulp treatment e.g. root canal), comparative dentistry and oral and maxillofacial surgery.

## Jennifer Stallwood

**BVSc BSc (hons) Cert AVP (ECC) MRCVS**

Jennifer Stallwood is a Bristol University graduate and recently completed a residency in small animal internal medicine. Jennifer works in a private referral practice in the Southwest and is interested in acute medicine.



## Michael Stanford

**BVSc FRCVS**

Michael Stanford qualified from Liverpool University in 1987. He set up Birch Heath Veterinary Clinic in Cheshire specialising in the veterinary care of exotic pets, zoo and wildlife patients. He was awarded the RCVS Diploma of Fellowship by thesis in 2006 for his work on calcium metabolism in grey parrots, became a RCVS Specialist in Zoological and Wildlife Medicine in 2007 and is a recipient of the BVA William Hunter medal. He has been a Claims Consultant for the Veterinary Defence Society since 2007 and is their Newsletter Editor. Michael is a recent past President of the BVZS.



## Jenny Stavisky

**MRCVS BVM&S PhD PGCE FHEA**

Jenny Stavisky is an Edinburgh graduate and after several years in mixed practice took an accidental PhD in epidemiology and virology. She is interested in all aspects of charity and shelter medicine and works at the University of Nottingham as Assistant Professor in Shelter Medicine.



## James Swann

**MA VetMB MVetMed DipACVIM DipECVIM MRCVS**

James Swann is an American and European Specialist in Small Animal Internal Medicine. He is currently completing a PhD in immunology and haematology at the University of Oxford. He has a particular interest in haematological diseases of dogs and cats, winning an International Canine Health Award from the Kennel Club Charitable Trust for his research work in 2015.



## Simon Tappin

**MA VetMB CertSAM DipECVIM-CA MRCVS**

Simon Tappin graduated from the University of Cambridge and after 2 years in practice undertook a residency at the University of Bristol in Small Animal Medicine and Intensive Care, where he gained his European Diploma in Small Animal Medicine. He is currently head of internal medicine and a director of the internship program at Dick White Referrals where he sees cases in all areas of internal medicine.



**Kathleen Tennant****BVetMed CertSAM CertVC FRCPath MRCVS**

Kathleen Tennant graduated from the Royal Veterinary College and fell into a life of clinical pathology. She is currently the Clinical Lead for the diagnostic laboratories for Langford Vets. Her interests include cytology and infectious diseases.

**Erik Teske****PhD DVM DipECVIM-CA(Int Med)(Oncol)**

Erik Teske is a European Specialist in Companion Animal Oncology. He is Professor in Medical Oncology at the Veterinary Faculty in Liege and Head of Medical Oncology at the Veterinary Faculty in Utrecht. He is author of more than 130 publications and more than 15 book chapters. His special areas of interest are oncology, cytology and epidemiology. He is an Honorary Member of the European College of Veterinary Clinical Pathology and was awarded the WSAVA Hill's Excellence in Veterinary Healthcare Award in 2006 and the WSAVA International Award for Scientific Achievement in 2016.

**Emily Thomas****BA VetMB DACVECC DECVECC MRCVS**

Emily Thomas is a Senior Lecturer in Emergency and Critical Care at the Royal (Dick) School of Veterinary Studies, and an American and RCVS Specialist in ECC. She heads up the Intensive Care Unit in the Hospital for Small Animals at the University of Edinburgh. She has a particular interest in CPR, but enjoys all aspects of ECC.

**Mickey Tivers****BVSc(Hons), PhD, CertSAS, DipECVS, MRCVS, RCVS and EBVS® European Specialist in Small Animal Surgery**

Mickey Tivers is Head of Surgery at Paragon Veterinary Referrals in Wakefield, West Yorkshire. Mickey's main area of clinical and research expertise is in congenital portosystemic shunts and he has published widely on the subject. He continues to have active research into this fascinating condition. Mickey graduated from the University of Bristol in 2002. He finished a residency in small animal surgery at the RVC in 2008 and became a diplomat of the European College of Veterinary Surgeons in 2009. Following this he undertook a PhD on congenital portosystemic shunts in dogs, also at the RVC.

**Helen Tottey****RVN**

Helen Tottey qualified in 1996 and set up full time nurse consulting in 1997 developing the role to become an integral part of the practice for clients, their pets and the busi-



ness. Helen has worked for Petplan and Onswitch, and owned her own practice. She currently works for VetPartners as Business Support Trainer. Helen has always had a passion for helping pet owners through education and support that nurse consulting enables as well as providing additional income stream for the business and job satisfaction for nurses.

**Sophie Tyler**

Sophie Tyler graduated from the RVC in 2007. After working in first opinion small animal practice in the UK, Australia and New Zealand she completed a rotating internship followed by a dermatology residency at the University of Bristol in 2019. She is currently working towards the ECVI diploma examination.

**Molly Varga****BVetMed DZooMed MRCVS**

Molly Varga is an RCVS Specialist in Zoo and Wildlife Medicine. She has published and lectured widely on a range of topics related to exotic animal medicine, and her primary clinical interest is rabbit medicine and surgery.

**Jaime Viscasillas****DipECVAA MA AFHEA MRCVS**

Jaime Viscasillas graduated at the University of Zaragoza (Spain) and is an European and RCVS Specialist in Veterinary Anaesthesia and Analgesia. Jaime works as a lecturer in Veterinary Anaesthesia and Analgesia at the Royal Veterinary College. One of his main interest is the development, use and teaching of local anaesthesia techniques for perioperative and chronic pain management.

**Holger Volk****PGCAP PhD DipECVN FHEA MRCVS**

Holger Volk is Professor of Small Animal Diseases and the Head of Department of the Small Animal Clinic, University of Veterinary Medicine Hanover, the Past-President of the European College of Veterinary Neurology and the current treasurer of the European Board of Veterinary Specialisation. After graduating University in 2001, where he also earned his PhD in Neuropharmacology, Holger completed his specialist clinical education doing an internship and a residency in Neurology and Neurosurgery at the Royal Veterinary College. Holger is internationally known for his work in the field of Chiari-like malformation/syringomyelia and epilepsy. He has been a recipient of several Jim Bee educator excellent in teaching awards, the prestigious Bourgelat Award from BSAVA and the International Canine Health Award from the Kennel Club.





# Our speakers

## Angelika von Heimendahl

**MScAg BVM(Berlin) MScVetSc DipECAR MRCVS**



Angelika von Heimendahl is a graduate of both Agriculture and Veterinary Medicine from the University of Berlin. She runs her own small animal reproduction referral practice near Cambridge, and teaches undergraduates, veterinary surgeons and veterinary nurses. Angelika was the President of EVSSAR (European Veterinary Society for Small Animal Reproduction) in 2010/11, president of the ECAR (European College of Animal Reproduction) examination board 2016/17 and is now an ECAR board member. In recent years she has also developed an interest in conservation and is a member of the Cambridge Conservation Forum.

## David Walker

**BVetMed(Hons) DACVIM DipECVIM-CA MRCVS**



David Walker is a Royal Veterinary College graduate and an American, European, and RCVS Specialist in Small Animal Internal Medicine. David works at Anderson Moores Veterinary Specialists and is Head of Medicine; he has a keen interest in all areas of internal medicine.

## Hayley Walters

**MBE RVN**



Hayley Walters spent 7 years in mixed practice in Derbyshire before relocating to China for 3 years in 2006 to work for 'Animals Asia' with bears rescued from the bile farming industry. Hayley is the welfare veterinary nurse at The Royal (Dick) School of Veterinary Studies, teaching nursing and clinical skills to veterinary students in developing countries and helping two vet schools in Sri Lanka and India set up their first veterinary nurse training programme. In 2018 Hayley received an MBE for services to veterinary education and animal welfare.

## Chris Warren-Smith

**BVetMed MVetMed CertVDI DipECVDI MRCVS**



Chris Warren-Smith is a graduate of the Royal Veterinary College and an RCVS and European Specialist in Veterinary Diagnostic Imaging. Chris is Head of Imaging at Langford Veterinary Services/University of Bristol; his main area of interest is cross sectional imaging, in particular CT.

## Ruth Willis

**BVM&S DVC MRCVS**



Ruth Willis graduated from the Royal (Dick) School of Veterinary Studies. Ruth spent two years in mixed practice before starting a cardiology residency at Glasgow University Vet School which resulted in her obtaining the RCVS Certificate and Diploma in Veterinary Cardiology. She has held RCVS Specialist status since 2003 and currently works at Dick White Referrals. Ruth has a special interest

in the diagnosis and treatment of arrhythmias. She has extensive experience of ambulatory heart monitor recording analysis and has written a chapter on this topic in the BSAVA Manual of Canine and Feline Cardiorespiratory Medicine. She is a co-editor of The Guide to Canine and Feline Electrocardiography.

## Matthew Winter

**DVM DACVR**



Matthew Winter is a graduate of Cornell University College of Veterinary Medicine and a Diplomate of the American College of Veterinary Radiology. Matt is an active educator, and has spent 13 years in academic practice at Iowa State University and the University of Florida, where he served as service chief of Diagnostic Imaging and Medical Director of the Small Animal Hospital. Matt is currently the Vice President of Veterinary Consultants in Telemedicine in North America and continues working at the University of Florida as a Clinical Associate Professor of Diagnostic Imaging. Matt loves all imaging modalities, but has a special passion for cross-sectional imaging, specifically Computed Tomography and Magnetic Resonance Imaging.

## Georgia Woods

**RVN CertCFVHNut PHC**



Georgia Woods qualified as a Veterinary Nurse in 2004 from Myerscough College, Preston. In 2010 Georgia moved to a Head Nurse and Clinical Coach position in Cheshire, developing successful obesity and other nursing clinics. In June 2015, Georgia took the position of ROYAL CANIN® Weight Management Clinic Nurse at the University of Liverpool, Small Animal Teaching Hospital, where she is now dealing exclusively with obesity and nutrition. Georgia has recently gained her Certificate in Canine and Feline Veterinary Health Nutrition.

## Claire Woolford

**RVN VTS(Anaesthesia and Analgesia)**



Claire Woolford began nursing in 1998 and spent 8 years working in general practice. In 2006 Claire joined Anderson Moores Veterinary Specialists in Hampshire where she is a head nurse and in charge of running the Soft Tissue department. She achieved her VTS in Anaesthesia and Analgesia in 2013 and is a member of the AVTAA Credentials Committee. Claire also works with SynergyCPD providing in house anaesthesia and CPR training for practices across the south of England.

## David Yates

**BVSc MRCVS**



David Yates is a Liverpool graduate and Hospital Director of the RSPCA Greater Manchester Animal Hospital. He is involved in teaching charity vet practice to final year students from Bristol and Nottingham Universities.

## Section III

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# Veterinary streams

Thursday 4 April

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Thursday 4 April  
Hall 1

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# My top tips in...

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|----|--|
| 20 | 08:30–09:15<br><b>Neurology</b><br>Richard LeCouteur       |
| 21 | 09:25–10:10<br><b>Oncology</b><br>Gerry Polton             |
| 22 | 11:05–11:50<br><b>Reproduction</b><br>Gary England         |
| 23 | 12:00–12:45<br><b>Soft tissue surgery</b><br>Mickey Tivers |
| 24 | 14:05–14:50<br><b>Cardiology</b><br>Ruth Willis            |
| 25 | 15:00–14:45<br><b>Orthopaedic surgery</b><br>Duncan Barnes |

## Neurology

**Richard LeCouteur**

Understanding the organization and relationship of structures is essential for a clinician caring for animals with neurological diseases because a clinician deals with the entire animal and with the entire nervous system. This requires a global approach that is based on an appreciation of how the functions of the various parts contribute to the function of the whole.

### **NORMAL FUNCTIONS MUST BE KNOWN BEFORE ABNORMAL FUNCTIONS CAN BE RECOGNIZED**

Abnormal functions must be recognized because neurological diseases are manifested clinically almost entirely by dysfunction. It is uncommon for the clinical signs to include readily detectable anatomical changes. Therefore, a clinician must rely on signs of abnormal function to identify structures that are malfunctioning.

General divisions of the nervous system are: brain, spinal cord, and peripheral nerves and muscles. The highest functional subdivision of the brain, and therefore the highest functional level of the nervous system, is the cerebrum. The cerebrum is the seat of consciousness and cognitive functions. It receives all sensory signals that reach consciousness, makes decisions on the most appropriate response, and initiates that response if one is needed.

In most cases the response the cerebrum initiates is a movement. This is called a *voluntary movement*. It is done by muscles innervated by lower motor neurons of the spinal cord or brainstem. The specific movement that is initiated is a phasic (on again, off again) event that may consist of nothing more than movement at one joint of an extremity. However, no matter how simple such movements may be, they require adjustments of other muscles so that opposing muscles relax or so that some joints are fixed while others are moved, or so that weight-bearing on the legs is adjusted to accommodate shifts in the centre of gravity.

The voluntary movement is initiated by the cerebral cortex and may be said to be an event of consciousness. The associated muscle activity is carried out subconsciously by successively lower levels of the nervous system: basal nuclei, midbrain, pons and medulla, cerebellum, spinal cord and brainstem, peripheral nerves and cranial nerves, and effector organs. The function of these lower levels is vital and without them voluntary movements become impossible.

In ourselves, we are conscious of the effects of these subconscious operations but we are not conscious of the complex neuronal transactions that produce them. These activities can be blocked normally only by very powerful cerebral cortical override and then only incompletely in most cases. Presumably animals also are not conscious of

the functions of these subcortical systems and presumably they might have even less success in overriding them if they somehow chose to do so.

### **ABNORMALITIES OF MOVEMENT AND POSTURE PRODUCE THE MOST COMMON NEUROLOGICAL SIGNS IN ANIMALS**

A very large proportion of these signs are caused by diseases that affect the subconscious events that occur in the many structures interposed between the cerebral cortex and the lower motor neurons. Because of the importance of these functions and the structures that produce them, recognizing signs of their dysfunction is an essential feature of that part of the general physical examination that we call the neurological examination.

### **KEY LEARNING OBJECTIVES**

- Understand the components of the nervous system and 'how the nervous system works'
- Understand that normal neurological functions must be known before abnormal functions can be recognized
- Understand that abnormalities of movement and posture produce the most common neurological signs in animals

### **MULTIPLE CHOICE QUESTIONS**

1. Which of the following is most likely to be a clinical sign of cerebral dysfunction?  
(A) Disturbance of consciousness  
(B) Paresis of voluntary movement  
(C) Disturbances of all types of sensory function  
(D) Seizures
2. Which of the following is NOT a function of the cerebellum?  
(A) To coordinate all of the subsystems that operate in locomotion and posture  
(B) To initiate coordinated movement  
(C) To coordinate eye position  
(D) To coordinate eye movements
3. Which of the following statements regarding neurological diseases is UNTRUE?  
(A) Neurological disease can be acute or chronic, progressive or non-progressive  
(B) Neurological signs of dysfunction reflect both the location and the cause of a lesion  
(C) Neurological diseases may result from causes inside the nervous system or outside the nervous system  
(D) The clinical signs of neurological disease are caused by dysfunction of the neurons

# Oncology

Gerry Polton

## FINE-NEEDLE ASPIRATION

If you are presented with a mass, always advise performing fine-needle aspiration (FNA). You should especially do this if the owner comes to you expressing concern about the presence of a mass. Failing to offer a diagnostic test and simply directing owners to monitor a mass will result in one of two outcomes. First, the mass remains benign, nothing bad happens and the owner forgets that you ever offered them your sage advice. Second, the mass grows, takes on characteristics of a malignant tumour and further action must be taken. Invariably, the mass is bigger and more infiltrative by this time. It might have developed metastasis (this might have been present at the outset but no-one will ever know). In this example, the owner has every reason to be cross if this simple test was never discussed at the original visit and the patient may die prematurely. FNA can be performed in a standing patient in almost all cases. Many times, the test will prove non-diagnostic. The likelihood of this is reduced with practice, but many mass lesions simply do not yield sufficient material for diagnosis. A non-diagnostic sample is still good because it makes it very unlikely that you were presented with a mast cell tumour. If you only get blood repeatedly, consider the possibility that you are dealing with a haemangioma or haemangiosarcoma.

## LYMPHOMA SUBTYPES

Lymphoma is not a single entity. There are multiple lymphoma subtypes and the different types have different patterns of behaviour, responses to therapy and prognoses. Characterization of lymphoma subtype is best achieved with a combination of histology and immunohistochemistry, or cytology and flow cytometry. Some forms of lymphoma may be poorly responsive to treatment. Some forms are very responsive to therapy and patients can be expected to live considerably longer with treatment than the stated average. Knowledge of these subtypes can be very helpful in counselling owners about whether to pursue chemotherapy or not (and in treatment selection).

## MAST CELL TUMOURS: IF IT LOOKS BAD, IT IS BAD

Although we all know that the (histological) grade of a mast cell tumour cannot be judged by any means other than histology, you can get a very good idea that a mast cell tumour is going to behave badly if its clinical presentation already tells that story. Rapid growth, ulceration, being fixed to underlying tissues, pain, volatility in size and multiplicity of satellite nodules are all clear signs of ill intent. If a diagnosis of mast cell tumour is made cytologically, further histological detail is not always necessary to judge that this tumour is going to behave in a high-grade manner.

## NO SURGERY IS BETTER THAN BAD SURGERY

There are many reasons why we can find ourselves on the precipice of an ill conceived oncological surgical procedure. If you find yourself in this situation, please trust your instinct and reconsider. Operating to remove a tumour without knowledge of the tumour behaviour increases the risk of incomplete removal. Hypoxia in a surgical site arising due to tension across sutures, infection, disruption of vascular supply by surgical dissection, even seromas, increases the survivability of residual cancer cells in the surgical site. Furthermore, those surviving cells are actually made more malignant by this hypoxic environment.

## KEY LEARNING OBJECTIVES

- Fine-needle aspiration is a safe, quick, cheap and useful test in veterinary practice
- Appreciate that differences exist between different lymphoma subtypes and that these differences have therapeutic and prognostic implications
- Be prepared to believe your clinical judgment in the context of aggressive-looking mast cell tumours and ill conceived oncology surgeries

## MULTIPLE CHOICE QUESTIONS

1. Which of the following statements about fine-needle aspirates is pertinent to sampling of enlarged lymph nodes?
  - (A) Lymphoid cells are very fragile, best results are achieved without negative pressure
  - (B) Haemodilution impairs cytological interpretation
  - (C) FNA is expensive and associated with risks
  - (D) Best results are often achieved with the combination of a 21-gauge needle and a 5-ml syringe
2. Which of the following statements about steroids and canine mast cell tumours is NOT true?
  - (A) Steroids induce shrinkage of the overall radius of infiltration of neoplastic mast cells from the centre of a mast cell tumour enabling complete tumour excision with a smaller surgical margin
  - (B) Steroids reduce intratumoral blood flow
  - (C) Steroids reduce the readiness with which mast cells release their intracytoplasmic granules
  - (D) Steroids impair the survival of some neoplastic mast cells
3. In the World Health Organization (WHO) classification, a 'normal' lymphoma manifesting as a generalized peripheral lymphadenopathy without signs of systemic ill health is most likely to be which of the following?
  - (A) T zone lymphoma
  - (B) Peripheral T cell lymphoma – not otherwise specified
  - (C) Diffuse large B cell lymphoma
  - (D) Acute lymphoblastic lymphoma

## Reproduction

**Gary England**

The reproductive cycle of the bitch is complex. Of particular note are the variability between bitches in the time of puberty, and individual differences in length of proestrus and oestrus. Interestingly, the day of ovulation may be as early as day 5 after the onset of proestrus or as late as day 30. Ovulated oocytes are not immediately fertilizable and maximum fertility occurs on days 3–5 after ovulation. Progesterone increases before ovulation to reach relatively high concentrations by the end of oestrus. The progesterone phase is similar in duration for pregnant and non-pregnant dogs; pseudopregnancy is common and normal. Following the 2-month luteal phase, hormone concentrations return to basal for the 5 months of anoestrus. The duration of the cycle is 7 months.

The following tips arise out of a review of questions from referring clinicians.

### KNOW HOW TO DIFFERENTIATE STAGES OF THE CYCLE

The oestrogenic phase of the cycle can most easily be detected using vaginal cytology, whereas progesterone is elevated similarly in the luteal phase of pregnancy and non-pregnancy. Hormone concentrations are basal in anoestrus but differ to spayed females.

### APPRECIATE THAT PUBERTAL PROBLEMS ARE COMMON

Failure of ovulation is common at puberty and is evident as prolonged proestrus/oestrus (lasting 8–10 weeks), or regression of oestrus with a short interval return ('split oestrus'). Ovulation may occur spontaneously or be induced by exogenous gonadotrophin-releasing hormone (GnRH) products or human chorionic gonadotrophin (hCG). Spay is not required but may be performed after establishing that packed cell volume (PCV)/clotting is normal.

### RECOGNIZE THAT BACTERIAL INFERTILITY IS EXTREMELY RARE

Most vaginal and preputial bacteria are commensals and do not cause infertility. Routine bacteriological screening is pointless and 'treatment' is unwarranted. The commonest causes of infertility are mating at the incorrect time, an infertile male and uterine disease.

### KNOW THAT TIMING OF MATING IS IMPORTANT

Ovulation may occur early or late in relation to onset of proestrus, so the time of optimal fertility is variable. Ovulation is poorly predicted by the behaviour of the female and requires detection using either measurement of plasma progesterone, vaginoscopy or vaginal cytology.

### UNDERSTAND THAT PHYSIOLOGY IS CRITICAL FOR CAESAREAN PLANNING

Pregnancy may occur even with an early or late mating since both sperm and oocytes have prolonged survival in the female tract. This may result in a variable 'apparent' pregnancy length when assessed from mating day (58–72 days), whereas endocrinological pregnancy length is regulated at  $63 \pm 1$  day from ovulation. Primary uterine inertia is common so that prediction of the day of whelping or Caesarean requires information collected during oestrus, fetal measurement during pregnancy, or assessment close to parturition.

### KEEP ABREAST OF CHANGING KNOWLEDGE AND PRACTICES ABOUT SPAYING

Whilst it is clear that iatrogenic pseudopregnancy can be prevented by spaying at any time except weeks 4–12 post oestrus, more information relating to prepubertal spay, ovariectomy, laparoscopic spay, hysterectomy and hormonal control is becoming available.

### KEY LEARNING OBJECTIVES

- Understand oestrous cycle endocrinology, how this is manifest clinically and how recognition of different phases of the cycle can assist with diagnosis
- Appreciate the physiology of ovulation and how this is important for the identification of the optimal time for mating, and the implications for the apparent pregnancy length
- Recognize pregnancy development and the cascade of events that lead to parturition and how these can be used for prediction of parturition and planning for Caesarean

### MULTIPLE CHOICE QUESTIONS

1. Which one of the following statements in relation to reproductive physiology of the bitch is CORRECT?
  - (A) Counting the number of days from the onset of proestrous behaviour can be reliably used to determine the onset of ovulation
  - (B) Acceptance of mating can be reliably used to determine the onset of ovulation
  - (C) Increased oestrogen concentrations can be reliably used to determine the onset of ovulation
  - (D) Increased progesterone concentrations can be reliably used to determine the onset of ovulation
2. Which one of the following is LEAST USEFUL for determining the likely time of onset of parturition in the bitch?
  - (A) The date of mating
  - (B) Measurement of plasma progesterone to assess the optimal time for mating
  - (C) Assessment of vaginal cytology to assess the optimal time for mating

- (D) The date that the bitch last permitted breeding
3. You examine a bitch that has alleged overdue parturition. Clinical examination is unremarkable and rectal temperature is normal. You don't have an ultrasound machine and so you run a progesterone assay which shows plasma concentrations are 1.2 ng/ml (4 nmol/l). Which one of the following is the MOST LIKELY diagnosis in this case?

- (A) Parturition should have started and is likely to be overdue
- (B) Parturition is not yet due because progesterone concentrations are high
- (C) Parturition is not yet due because rectal temperature has not decreased
- (D) Parturition is not yet due because progesterone has not decreased and therefore there has been no decline in rectal temperature

# Soft tissue surgery

Mickey Tivers

## INTRODUCTION

Soft tissue surgery is a very broad subject covering a wide variety of different conditions, organ systems and techniques. Some 'tips' are very broad and transferable to many different situations and others are very specific to the management of certain disease processes. In general, one of the best tips is to remember not to focus entirely on the surgery and to consider the preoperative assessment and post-surgical management in detail.

## HALSTEAD'S PRINCIPLES

The surgeon should always follow these important principles to reduce the risk of complications. Atraumatic instruments should be used appropriately, particularly when handling viscera. Monofilament, synthetic, absorbable suture material is recommended for most routine procedures.

## PATIENT SAFETY

Surgical safety checklists have recently been adopted by the veterinary profession. Whilst in some circumstances they may be overly complicated, some form of checklist for surgery is undoubtedly a good thing. A swab count at the start and end of surgery and the use of swabs with radiopaque markers are both important ways to prevent swabs being retained.

## APPROPRIATE USE OF ANTIBIOTICS

With increasing concern over antimicrobial resistance, surgeons should ensure that antibiotics are used in the correct way for surgical prophylaxis.

## USE OF GADGETS

There are increasing number of devices available to aid the soft tissue surgeon, including electrocautery, vessel-sealing devices and surgical staplers. These can facilitate

surgery and may be particularly useful in emergency situations.

## EXPLORATORY LAPAROTOMY

Exploratory laparotomy is commonly performed in small animal practice and it is important to have a logical and systematic approach. Exploratory laparotomy is made significantly easier by making a large incision and with the use of abdominal retractors. Suction is also invaluable, particularly when dealing with haemoabdomen, uroabdomen and septic peritonitis. The duodenal and colonic manoeuvres are very useful, particularly in dealing with haemorrhage during a bitch spay.

## SKIN MASSES

Cutaneous and subcutaneous masses are commonly removed in practice and most are benign. However, fine-needle aspirate sampling of any suspicious mass prior to surgery can be invaluable to identify malignant tumours. It is also prudent to consider appropriate staging of known tumours prior to removal. The surgery should be carefully planned, with consideration given to appropriate surgical margins, options for closure of the resultant defect and potentially a plan for dealing with incomplete margins. Ideally, all masses should be submitted for histopathology, finances allowing.

## WOUND BREAKDOWN

Wounds that break down following surgery should be treated as contaminated and initially managed as an open wound with dressings, etc. Surgeons should not rush to close the wound, particularly if the underlying reason for the breakdown had not been addressed (e.g. infection or tension).

## DRAINS

Drains come in all shapes and sizes and are indicated for a wide variety of uses. Narrow-bore thoracostomy tubes can be conveniently placed via the Seldinger technique and are very effective for short-term use dealing with pneumothorax, pleural effusion and for post-thoracotomy management. Placement of cystostomy tubes is a very useful technique for dealing with animals suffering urethral trauma.



# My top tips in...

## KEY LEARNING OBJECTIVES

- To recognize and describe general ways to refine surgical technique and approach to surgical cases to maximize success and reduce complications
- To outline and describe the use of specific instruments and techniques designed to facilitate soft tissue surgery
- To outline and describe appropriate management techniques for common situations and complications in soft tissue surgery

## MULTIPLE CHOICE QUESTIONS

1. What is the recommended antibiotic prophylaxis for a subcutaneous mass removal under aseptic conditions that is expected to be quick?  
(A) Single subcutaneous injection of broad-spectrum antibiotic at induction of anaesthesia  
(B) Five-day oral course of broad spectrum antibiotic post-surgery

- (C) Single intravenous injection of broad-spectrum antibiotic approximately 20 minutes prior to surgery  
(D) No antibiotics should be given
2. What sort of suture material is recommended for gastrointestinal surgery?  
(A) Multifilament, natural, absorbable (e.g. chromic catgut)  
(B) Monofilament, synthetic, non-absorbable (e.g. nylon)  
(C) Monofilament, synthetic, absorbable (e.g. PDS II)  
(D) Multifilament, synthetic, absorbable (e.g. Vicryl)
3. What structure would you manipulate in order to find the left ovarian pedicle?  
(A) Descending duodenum  
(B) Descending colon  
(C) Bladder  
(D) Stomach

# Cardiology

Ruth Willis

## REMEMBER THAT CARDIAC DISEASE IS LOGICAL

Cardiac diseases form a spectrum ranging from benign physiological heart murmurs in athletic individuals to patients with severe life-threatening illness where immediate intervention is required to preserve life. Deciding where an individual lies on this spectrum is done by assimilating information from history, clinical examination and the results of any diagnostic tests to arrive at a diagnosis that can then be used to guide treatment.

Assuming that the patient is not showing imminent signs of cardiovascular collapse, a careful history to establish the severity and duration of clinical signs, especially with regard to ability to exercise and a precise description of any collapse events, is vital. It can also be useful to establish the owner's primary concern, as this may be different to our concern and require discussion to prioritize investigations.

As signs of cardiac disease can overlap with other conditions (especially respiratory disease), the history can help us to decide whether we are treating cardiac or non-cardiac disease. The next step is to perform a careful clinical examination and relate these findings to the history. It is important to relate auscultation findings to cardiac output signs. These points will be illustrated with case examples.

## DECIDE WHETHER FURTHER DIAGNOSTIC TESTS ARE REQUIRED. IF SO, THEN WHICH ONE?

It is much easier to treat cases appropriately when we have a secure diagnosis. Diagnostic tests perform well

when applied to an appropriate population, the limitations of the test are known and our tests are targeted to answering a specific clinical question.

Case examples will be provided illustrating when it would be appropriate to use an NTproBNP assay, resting and ambulatory electrocardiography, echocardiography and thoracic radiographs. A common clinical question we are asked is to differentiate stage B1 and B2 mitral valve disease and this will be illustrated during the lecture with case examples.

## BE ABLE TO RECOGNIZE ATRIAL FIBRILLATION

Atrial fibrillation is one of the most common tachyarrhythmias seen in general practice that is likely to require treatment. Atrial fibrillation is most often seen in large- and giant-breed dogs and is characterized by a chaotic heart rhythm that is often rapid. In most dogs there is underlying structural heart disease that will sometimes result in referable clinical signs.

In cases with atrial fibrillation, the electrocardiograph shows an irregular, often rapid, narrow QRS complex rhythm with P waves replaced by fibrillation waves. Further diagnostic testing in cases with atrial fibrillation is likely to involve echocardiography and sometimes a 24 hour ambulatory electrocardiogram (ECG) to establish the mean heart rate and also assess whether there is significant malignant ventricular ectopy. The advantages and disadvantages of different anti-arrhythmic therapies and also treatment goals will be briefly discussed.

## BE ABLE TO RECOGNIZE VENTRICULAR TACHYCARDIA

Ventricular tachycardia is a potentially life-threatening arrhythmia frequently seen in cases with severe underlying cardiac and/or systemic disease. The ECG trace in these cases will show wide, bizarre QRS complexes and the rate

is variable. Some cases may tolerate this rhythm but other dogs show intermittent or persistent hypotension resulting in referable clinical signs. Decision making regarding further testing and therapy will be briefly discussed.

## KEY LEARNING OBJECTIVES

- Remember that cardiac disease is a logical series of events
- Understand how to select the most appropriate diagnostic test(s)
- Be able to recognize ventricular tachycardia and atrial fibrillation

## MULTIPLE CHOICE QUESTIONS

1. What are the key ECG features that raise suspicion of atrial fibrillation?
  - (A) Regular, slow, narrow QRS complex rhythm with clear P waves
  - (B) Regular, fast, narrow QRS complex rhythm with clear P waves

- (C) Irregular, rapid, narrow QRS complex rhythm without visible P waves
  - (D) Regular, rapid, wide QRS complex rhythm without visible P waves
2. What are the key ECG features that raise suspicion of ventricular tachycardia?
  - (A) Regular, slow, narrow QRS complex rhythm with clear P waves
  - (B) Regular, fast, narrow QRS complex rhythm with clear P waves
  - (C) Irregular, rapid, narrow QRS complex rhythm without visible P waves
  - (D) Regular, rapid, wide QRS complex rhythm without P waves coupled to the QRS complexes
3. Thoracic radiography is the test of choice to determine which of the following?
  - (A) Presence of pulmonary oedema
  - (B) The dimensions of individual cardiac chambers
  - (C) Indices of systolic function
  - (D) Aetiology of a heart murmur

# Orthopaedic surgery

## Duncan Barnes

Performing orthopaedic surgery can be an extremely rewarding experience with the opportunity to rapidly and permanently resolve conditions which are causing significant patient morbidity. To get the best outcomes, and reduce the chances of complications, it is important to have a logical and systematic approach to cases. Success in orthopaedic surgery starts long before entering theatre, with an accurate and complete diagnosis of the problem being treated and any concomitant factors that could influence the outcome. Prior to any surgical procedure a thorough plan should be made, including alternative approaches if additional problems are found at surgery. The plan should include:

- The surgical approach to the bone or joint, with consideration of important anatomical structures such as nerves and blood vessels which need to be avoided or protected
- Potential intraoperative and postoperative complications should be anticipated and strategies to address these formulated
- Ensure that all the necessary instrumentation and implants needed to action the plan are available and sterile
- Use a well designed preoperative checklist to reduce the chance that avoidable errors occur

The success of many orthopaedic surgeries can be improved by using a number of tips gleaned from both clinical research and clinical experience. This lecture will look at some general tips for successful orthopaedic surgery as well as more specific tips for selected common

surgeries including small animal fracture repair, cranial cruciate ligament disease and medial patellar luxation.

## FRACTURE REPAIR

- Use biological osteosynthesis techniques when there are three or more fragments in diaphyseal fractures of long bones
- Articular fractures should be repaired using rigid internal fixation following perfect reduction of the fracture fragments
- Distal tibial fractures in cats are prone to delayed union or non-union and can be reliably repaired using orthogonal plating techniques

## CRANIAL CRUCIATE LIGAMENT DISEASE

- Tibial plateau levelling osteotomy (TPLO) has been shown to have the best clinical outcome compared to tibial tuberosity advancement (TTA) and lateral extracapsular suture techniques
- Performing a medial subpatellar arthrotomy significantly reduces patient morbidity compared to a lateral parapatellar arthrotomy
- Performing a cranial closing wedge osteotomy in juvenile dogs with cranial cruciate ligament avulsion allows continued growth of the tibia whilst effectively neutralizing cranial tibial thrust

## MEDIAL PATELLAR LUXATION

- When performing tibial tuberosity transposition, ensure that the osteotomy is made sufficiently caudally and extends the entire length of the tibial crest to provide a large bone fragment. This will reduce the chances of the fragment splitting and

# My top tips in...

allows a greater degree of lateralization to be performed

- Performing a block recession sulcoplasty improves the contact area between the patella and the trochlear groove, especially at the proximal and distal ends of the groove, when compared to a wedge recession trochleoplasty
- Drilling a hole along the base of a block recession trochleoplasty reduces the chance of splitting the block when using an osteotome

## KEY LEARNING OBJECTIVES

- Find out how to improve your orthopaedic surgical outcomes and reduce the chance of complications
- Find out how to select cases for orthopaedic surgery and avoid common pitfalls
- Learn tips to use when performing common orthopaedic procedures

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is important during fracture planning?

- (A) Knowledge of the surgical approach to the fractured bone
- (B) Location of neurovascular structures
- (C) Templating of appropriate sized implants
- (D) All of the above

2. Which of the following does NOT reduce the chance of relaxation following surgical correction of medial patellar luxation?

- (A) Performing recession sulcoplasty
- (B) Performing secure closure of the lateral parapatellar joint capsule and retinaculum
- (C) Preserving the articular cartilage of the trochlear groove
- (D) Performing tibial tuberosity transposition

3. Which of the following fractures is best treated by dual bone fixation?

- (A) Fractures of the radius and ulna in a cat
- (B) Fractures of the tibia and fibula in a cat
- (C) Fractures of the radius and ulna in a dog
- (D) Fractures of the ilium and ischium in a dog

Thursday 4 April  
Hall 4

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# Surgical complications

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- 28 08:30–09:15  
**My wound broke down: what now?**  
Mickey Tivers
- 29 09:25–10:10  
**My enterotomy is leaking: what now?**  
Mickey Tivers
- 30 11:05–11:50  
**Having difficult conversations**  
Christine Magrath
- 30 12:00–12:45  
**Something is bleeding: what now?**  
Rachel Hattersley
- 31 14:05–14:50  
**I didn't get surgical margins: what now?**  
Mickey Tivers
- 32 15:00–15:45  
**I left a urolith behind: what now?**  
Rachel Hattersley

# Surgical complications

## My wound broke down: what now?

**Mickey Tivers**

### INTRODUCTION

Wound breakdown can occur for a variety of reasons and often there is more than one factor playing a role. These factors can relate to the wound itself, to the animal or to the surgery performed. Common causes of wound breakdown include excess tension or motion, infection, haematoma or seroma formation and patient interference. It is important to identify and understand the reasons for wound breakdown as this will help guide the correct management. Repeat surgery is unlikely to be successful unless the underlying reason for the wound breakdown has been addressed. It is important to avoid the downward spiral of repeat suturing and repeat breakdown!

### CAUSES OF WOUND BREAKDOWN

Wound breakdown can occur soon after surgery or several days or weeks later. The clinician should consider what factors may have been involved in the breakdown. Patient interference, infection, haematoma or seroma may be obvious clinically or from the history. Although rarely the primary cause of wound breakdown, systemic factors that may inhibit wound healing, such as metabolic disease, use of corticosteroids or chemotherapeutic agents, should be identified and addressed. Unfortunately, excessive tension often plays a role in wound breakdown.

### DEALING WITH A WOUND BREAKDOWN

All wounds that break down should be treated as a contaminated and ideally should not be closed until the contamination is resolved.

Initial wound management:

1. Large clip around the wound
2. Surgical debridement and lavage with sterile saline
3. Deep swab or biopsy for culture and sensitivity testing
4. Treatment with broad-spectrum antibiotics
5. Use of appropriate dressings such as wet to dry or honey/Intrasite combined with semi-permeable foam dressing

Dressings are continued until granulation tissue develops. Once granulation tissue has formed then wound closure may be performed. However, many wounds will heal satisfactorily via secondary intention.

It is very important to maintain excellent hygiene practices whilst managing a wound, to prevent spread

of infection. Hands should be washed before and after handling the animal and gloves should be worn when changing the dressing and examining the wound.

Immediate closure of a wound following breakdown may be indicated if vital structures such as the thoracic cavity or a joint are involved. In these circumstances, the wound should be flushed and debrided prior to closure, and a drain should be placed.

### PREVENTION OF WOUND BREAKDOWN

By following Halstead's principles, surgeons can reduce the risk of complications that may lead to breakdown. Excessive tension is a major factor in wound breakdown and the surgeon should carefully assess the wound and select methods of closure that reduce or eliminate tension. In some situations, this may require the use of a more advanced technique such as a subdermal plexus flap, axial pattern flap or skin graft. Surgeons should reflect on their own practice to determine whether asepsis or surgical technique could be improved. Wounds in certain locations, such as areas of high motion, may be more likely to have complications and these should be mitigated against. Importantly, animals should be appropriately rested and Elizabethan collars, body suits and bandages should be used to prevent interference.

### KEY LEARNING OBJECTIVES

- To describe and outline the management of wound breakdown
- To define and explain the different causes of wound breakdown
- To describe and outline the strategies for reducing the risk of wound breakdown

### MULTIPLE CHOICE QUESTIONS

1. How should a wound that has broken down be classified?  
(A) Clean  
(B) Clean-contaminated  
(C) Contaminated  
(D) Infected
2. What factor may the surgeon need to consider the use of a skin flap to overcome?  
(A) Tension  
(B) Infection  
(C) Seroma formation  
(D) Malnutrition
3. What is the main property of a foam dressing?  
(A) Adherent  
(B) Occlusive  
(C) Bioactive  
(D) Absorbent

# My enterotomy is leaking: what now?

Mickey Tivers

## INTRODUCTION

Enterotomy is commonly performed in small animal practice, typically for the removal of foreign bodies and for taking full-thickness biopsies of the small intestine. Whilst most enterotomies heal without issue, dehiscence and leakage results in septic peritonitis. Studies have reported dehiscence rates of 1.5–15% for enterotomy and enterectomy.

Early recognition of clinical signs associated with peritonitis, rapid diagnosis, rapid correction of the cause and intensive supportive care are essential for successful management. However, septic peritonitis is challenging to treat and mortality rates for animals with peritonitis remain high.

## DIAGNOSIS OF ENTEROTOMY BREAKDOWN/SEPTIC PERITONITIS

Leakage from intestinal surgical sites typically occurs at 3–5 days post surgery, when the wound is at its weakest as the initial fibrin seal is being replaced with collagen. Clinical signs associated with intestinal leakage and peritonitis include abdominal pain, signs of hypovolaemic shock (tachycardia, poor pulse quality, pale mucous membranes and collapse), depression, anorexia, vomiting and pyrexia. Rapid investigation and treatment should be performed if peritonitis is suspected following intestinal surgery. Most animals with peritonitis will have an abdominal effusion and abdominocentesis and abdominal fluid cytology is the single most useful diagnostic test. A smear can be quickly stained and analysed 'in house'. The presence of degenerate neutrophils with intracellular bacteria is indicative of septic peritonitis and surgery is mandatory.

## MANAGEMENT OF SEPTIC PERITONITIS

Rapid stabilization, exploratory laparotomy and repair of intestinal leakage, reduction of contamination, prevention of ongoing infection/inflammation and intensive postoperative care and nutrition are the key steps for the successful management of septic peritonitis.

### Stabilization

Initial therapy is aimed at improving the animal's perfusion status with intravenous fluid therapy. The use of shock rates of crystalloid fluids or artificial colloids (hydroxyethyl starches) may be necessary. Electrolyte abnormalities and hypoglycaemia must also be addressed. Animals should be administered analgesia soon after presentation, ideally with a pure opioid agonist. They should be treated with broad-spectrum intravenous antibiotics such as potentiated amoxicillin or cefuroxime.

## Surgical management

An exploratory laparotomy is performed, and the site of leakage is identified and is revised to prevent further leakage. This can involve the placement of additional sutures, debridement of the edges of the enterotomy prior to resuturing or resection of the affected area and anastomosis (enterectomy). The surgical site should be omentalized or a serosal patch placed.

Reduction of infection is primarily achieved by copious lavage with warmed physiological saline solution. A sample of fluid should be taken for bacterial culture and sensitivity and broad-spectrum intravenous antibiotics should be continued pending the results.

Ongoing peritoneal drainage is often necessary following surgery. This can be via closed suction drains or open peritoneal drainage.

## Postoperative care and outcome

Postoperative management can be challenging and is vital for ensuring a good outcome. Major body systems should be monitored closely along with electrolyte, acid–base and serum protein status. Many animals are anorexic following surgery. Placement of a feeding tube at the time of surgery provides access for enteral nutrition which improves enterocyte function and may minimize bacterial translocation across intestinal walls.

Mortality rates of 15–80% have been reported following intestinal dehiscence and peritonitis.

## KEY LEARNING OBJECTIVES

- To recognize the clinical signs associated with enterotomy breakdown and septic peritonitis and to describe the diagnosis of septic peritonitis
- To describe and outline the key steps in the management of septic peritonitis
- To describe and outline the appropriate surgical technique for enterotomy

## MULTIPLE CHOICE QUESTIONS

1. What is the single most useful test to identify that an enterotomy is leaking causing septic peritonitis?
  - (A) Contrast abdominal radiography
  - (B) Cytology of an abdominal fluid sample
  - (C) Computed tomography (CT) scan
  - (D) Neutrophil count on routine haematology
2. When, post-surgery, is enterotomy leakage most likely to occur?
  - (A) <24 hours
  - (B) 1–2 days
  - (C) 3–5 days
  - (D) 6+ days
3. What fluid is recommended for abdominal lavage?
  - (A) Saline
  - (B) Chlorhexidine gluconate
  - (C) Povidone–iodine
  - (D) Tap water



# Surgical complications

## Having difficult conversations

Christine Magrath

Difficult conversations with clients can be stressful particularly when they relate to surgical complications. There are three components of clinical communication skills:

- Content skills, i.e. what you communicate
- Process skills, which is how you communicate and includes how you discover and provide information, as well as how you structure the interaction and how you relate to, and involve the client
- Perceptual skills, which is part of your own internal decision making and includes, not only your internal problem solving strategies, but also your own feelings, self-concept and self-confidence

Although all three components of clinical communication skills are important and inextricably linked, the session will focus mainly on the process skills, which will be dissected to reveal some of the individual elements which are essential if we are to master and apply them. Extensive research has shown that when it's a difficult conversation these core skills need to be delivered with greater intention, intensity and awareness. Often emphasis is put on the amount of information that is retained by clients but studies in veterinary and human medicine also show that individuals do not always understand the meaning of key messages nor are they necessarily happy or committed to the explanations that are given. Furthermore the language that is used along with our non-verbal behaviour can be key contributors as to whether the client is on board or feels that something has gone wrong.

While delineating and discussing the specific skills can help ensure that the client goes down the former route, the session will also look at how we can pick up cues and explore them when the client remains unsatisfied.

### KEY LEARNING OBJECTIVES

- How to say sorry and mean it without admitting liability
- Understanding the importance of explicit signposting, i.e. a warning shot and the impact on the client if this is not delivered effectively
- How to best respond to emotional clients

### MULTIPLE CHOICE QUESTIONS

1. To ensure you have informed consent, must you always have a consent form signed?  
(A) Yes  
(B) No
2. In emotional situations, what makes up face-to-face communication?  
(A) Words 7%, tonality 38% and body language 55%  
(B) Words 20%, tonality 40% and body language 40%  
(C) Words 30%, tonality 20% and body language 50%
3. When providing information in a clinical setting, how much is recalled by the client?  
(A) 40–50%  
(B) 50–60%  
(C) 60–70%

## Something is bleeding: what now?

Rachel Hattersley

### INTRODUCTION

Post-surgical haemorrhage is potentially a life-threatening issue and one which should be closely monitored. However, the decision as to if or when to re-open an abdomen post-surgery is not always cut and dried. This lecture will discuss the most common causes of post-surgical haemorrhage and the decision making involved in dealing with these. The most common cause of haemorrhage post abdominal surgery is iatrogenic haemorrhage from a vessel which has been ligated at surgery, e.g. in ovariectomy or ovari hysterectomy. Technical error is reported to be responsible for 75–90% of significant intraoperative haemorrhage in humans. However, haemorrhage can infrequently be seen secondary to coagulopathy.

### CAUSES

- Trauma
- Iatrogenic:
  - Failure to adequately repair or ligate vessels transected at surgery
  - Failure to identify all sources of haemorrhage at surgery
  - Damage to other organs during the course of the surgery
- Coagulopathy:
  - Thrombocytopenia
  - Thrombocytopathia
  - Inherited disorders, e.g. von Willebrand disease
  - Acquired, e.g. vitamin K deficiency
  - Inherited factor deficiency, e.g. haemophilia A

### IDENTIFICATION OF HAEMORRHAGE

- Clinical signs:
  - Delayed capillary refill time
  - Pallor
  - Reduced pulse quality/hypotension

- Tachycardia (the compensated phase of hypovolaemic shock in cats can be short lived and they can therefore present with bradycardia)
- Reduced urine output
- Do you have a reason to suspect postoperative haemorrhage?
  - Is there a recent history of surgery? If so – what surgery has been performed and is there a possibility of significant ongoing haemorrhage?
  - Do you have reason to suspect a coagulopathy? Is there haemorrhage from more than one site? (this makes coagulopathy more likely but single-site haemorrhage does not preclude coagulopathy); Is the dog a sighthound? (moderate to severe haemorrhage has been reported after routine gonadectomy in 25% of retired racing Greyhounds – this is thought to be due to altered fibrinolysis)
- Confirm your diagnosis:
  - Confirm the presence of haemorrhage – ultrasound-guided centesis and assessment of packed cell volume (PCV) of the fluid. If the PCV of the fluid is comparable to systemic PCV, this is suggestive of ongoing haemorrhage
  - Review platelet numbers (manual assessment as well as automated count)
  - Perform a buccal mucosal bleeding time (to assess platelet function)
  - Check coagulation times if appropriate

## WHEN TO INTERVENE?

- Are there signs of hypovolaemic shock? If so instigate fluid resuscitation with the aim of correcting perfusion deficits without disrupting thrombus formation (the goal is to maintain systolic blood pressure of 90 mmHg). This may involve crystalloid, colloid or blood products
- If you suspect a technical or iatrogenic cause of haemorrhage, repeat exploration of the area should be considered and repeat ligation of vessels attempted. If ligation is not a viable option for

control of haemorrhage, e.g. in the case of a hepatic capsular laceration, topical haemostatic agents such as Lyostypt can be applied

- If coagulopathy is suspected, treatment should be directed to the specific underlying cause

## SUMMARY

Technical issues are the most common cause of post-surgical haemorrhage so ensure you explore this possibility thoroughly. Consider coagulopathy if there is a suspicion based on breed, clinical signs or laboratory testing.

## KEY LEARNING OBJECTIVES

- Identifying possible causes of post-surgical haemorrhage
- Stabilization of the haemorrhaging patient
- Surgical management of haemorrhage

## MULTIPLE CHOICE QUESTIONS

1. What is the name of the coagulopathy seen in sighthound breeds?
  - (A) Hyperfibrinolysis
  - (B) von Willebrand's disease
  - (C) Haemophilia A
  - (D) Evan's syndrome
2. What is our goal in terms of systolic blood pressure when performing fluid resuscitation?
  - (A) 60 mmHg
  - (B) 70 mmHg
  - (C) 80 mmHg
  - (D) 90 mmHg
3. What is the most common cause of post-surgical haemorrhage in human medicine?
  - (A) Coagulopathy
  - (B) Ongoing haemorrhage in trauma patient
  - (C) Iatrogenic technical issues
  - (D) Thrombocytopenia

# I didn't get surgical margins: what now?

**Mickey Tivers**

## INTRODUCTION

For many tumours, complete surgical removal can be curative, assuming that the tumour has not metastasized. However, if the mass is not completely removed then this can result in tumour recurrence. It is recommended that all excised masses are submitted for histopathology. This allows confirmation of the tumour type and prediction of its biological behaviour based on its histopathological features (grade). The pathologist will examine the cut edges of the excised tissue or 'margins' to assess whether

the whole tumour was removed or whether it is likely that some remains in the animal.

## COMMON SCENARIOS RESULTING IN INADEQUATE MARGINS

- The mass was removed with appropriately wide margins, intended to completely remove the tumour but the histopathology suggests that these were inadequate (incomplete margins)
- It was not possible to remove the mass with wide margins and therefore a marginal or limited excision of the mass was performed. The surgeon is expecting incomplete margins
- The mass was not sampled prior to surgery or was assumed to be benign and therefore surgical margins were inadequate

# Surgical complications

The exact scenario may influence the next steps in dealing with the incomplete margins. Client finances and willingness to consider the various treatment options may play an important role in decision making.

## DEALING WITH INCOMPLETE MARGINS

There are several strategies for dealing with incomplete margins and the type of tumour will have a significant influence on these options. It is very important to stage the tumour for local or distant metastases prior to making the definitive decision, as this may limit the options available.

### Do nothing/monitor the surgical site

For some tumours, dirty margins do not necessarily mean that tumour recurrence is inevitable. Indeed, for low grade soft tissue sarcomas (STSs) and mast cell tumours (MCTs) the recurrence rate for incompletely excised tumours is low. This option may appeal to some owners, particularly if finances are limited.

### Repeat surgery

For low grade MCTs and STSs, complete surgical removal is the treatment of choice. Therefore, revision surgery to remove the scar from the previous surgery with wide margins is indicated. However, this may be more challenging/impossible in areas with limited tissue such as the distal limb.

### Radiotherapy

This can be an effective treatment for certain tumours, particularly if further surgery is not an option. Indeed, adjuvant radiotherapy is often planned for STS or MCT, where surgery is challenging and incomplete margins are expected.

### Chemotherapy

This can be a good option for certain types of tumour, particularly if further surgery is not possible or metastases are present (e.g. MCTs), but others do not respond to chemotherapy (e.g. STSs).

### Metronomic chemotherapy

This form of chemotherapy primarily inhibits angiogenesis and therefore prevents or delays tumour regrowth.

It has been recommended for the treatment of incompletely excised STSs to prevent recurrence.

## REDUCING THE RISK OF INCOMPLETE MARGINS

In general, the best prognosis is if complete excision is achieved at the time of the first surgery. This emphasizes the need for preoperative sampling of masses, appropriate tumour staging and considered surgical planning.

## KEY LEARNING OBJECTIVES

- To outline and describe the different options for managing incomplete margins following tumour excision
- To describe and explain the factors that influence the decision making in dealing with incomplete margins
- To define and recognize the ways in which the risk of incomplete margins can be reduced

## MULTIPLE CHOICE QUESTIONS

1. What is the recommended treatment for most low-/intermediate-grade soft tissue sarcoma?  
(A) Radiotherapy  
(B) Wide surgical excision  
(C) Chemotherapy  
(D) Metronomic chemotherapy
2. What is the reported rate of recurrence of low-grade soft tissue sarcomas treated with marginal excision?  
(A) 11%  
(B) 21%  
(C) 31%  
(D) 41%
3. What is the primary mechanism of action of metronomic chemotherapy?  
(A) Kills cancer cells  
(B) Inhibits angiogenesis  
(C) Modulates the immune system  
(D) Anti-inflammatory effect

## I left a urolith behind: what now?

Rachel Hattersley

## INTRODUCTION

Incomplete urolith removal is reported in 20–42% of cases where surgical removal is attempted. This is obviously a significant number of cases! This lecture aims to provide practical tips on how to avoid incomplete urolith

removal and what to do when you do find yourself in this situation.

## UROLITH IDENTIFICATION

In an ideal world, knowing how many uroliths you are expecting to retrieve is a good place to start in terms of prevention of incomplete removal. There are obviously times where this is not practical (e.g. when the bladder is filled to capacity with uroliths); however appropriate imaging should help to approximate the number of uroliths in at least some cases.

Contrast radiography has an important role to play in imaging of the lower urinary tract as it allows assessment

of the urethra in addition to the bladder. Even when dealing with radio-opaque uroliths, such as calcium oxalate, superimposition of the pelvis can obscure urethral calculi which have been shown to have the highest risk of incomplete removal. As brachycephalic breeds increase in popularity, so the incidence of cysteine uroliths (which are radiolucent) is likely also to increase.

## SURGERY

Retrohydropulsion can be used to flush urethroliths back in to the bladder lumen prior to surgery. However during preparation and positioning of the patient for surgery, it is common for uroliths to move back in to the urethra. The urethra must therefore be lavaged at surgery in both an antegrade and retrograde direction using copious volumes of sterile saline (and the prepuce or vulva must be clipped and aseptically prepared so it can be accessed from the surgical field) and the largest-bore catheter which can be accommodated. Do not forget that it is possible to advance a rigid catheter past a urolith so pay particular attention to any 'grating' which you can feel as you advance your catheter along the urethra.

## POSTOPERATIVE IMAGING

Given the high rate of incomplete urolith removal following cystotomy, postoperative radiography of the lower urinary tract should be performed after each surgery. Ideally this should involve positive-contrast radiography of the urethra, particularly in cases involving radiolucent uroliths.

If you do identify incomplete removal of uroliths, don't panic! Your next step is to inform the owner of the complication and document that you have done so in the clinical notes. It is preferable to retrieve the retained uroliths whilst the patient is still anaesthetized if possible (unless you already know the type of urolith and know the uroliths to be amenable to medical management). One option is to re-open the ventral cystotomy and

remove the remaining uroliths. Cystoscopic removal is another option depending on availability of equipment and the size of the uroliths. If the retained uroliths are small (the exact dimensions will depend on patient size, but as a ball park, <3 mm) and the owners decline further surgery, monitoring using radiography (plain versus contrast) can be considered to see if the uroliths are voided. However, the owner must be made aware of the risk of repeat obstruction or ongoing infection/inflammation caused by the presence of the uroliths.

## KEY LEARNING OBJECTIVES

- Use of postoperative imaging in urolithiasis
- How to avoid incomplete urolith removal
- Options for managing incomplete urolith removal

## MULTIPLE CHOICE QUESTIONS

1. Uroliths are reported to be left in situ post cystotomy in up what percentage of cases?
  - (A) 17%
  - (B) 42%
  - (C) 63%
  - (D) 80%
2. Which type of urolith is associated with brachycephalic breeds and entire male dogs?
  - (A) Calcium oxalate
  - (B) Struvite
  - (C) Cysteine
  - (D) Urate
3. What is the most appropriate diagnostic test for identification of urethroliths?
  - (A) Plain radiography
  - (B) Positive-contrast cystogram
  - (C) Retrograde urethrogram
  - (D) Intravenous urogram



Thursday 4 April  
Hall 5

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# Oncology

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- 36 08:30–09:15  
**Paraneoplastic syndromes**  
Erik Teske
- 37 09:25–10:10  
**Biopsies: getting good results**  
Jonathan Bray
- 38 11:05–11:50  
**Pathology reports: what a clinician needs to know**  
Erik Teske
- 39 12:00–12:45  
**Is advanced imaging always better?**  
Gerry Polton
- 40 14:05–14:50  
**Planning oncological surgery**  
Jonathan Bray
- 41 15:00–15:45  
**Chemotherapy: the basics**  
Erik Teske
- 42 15:50–16:35  
**Oncology treatments: new and on the horizon**  
Gerry Polton



## Paraneoplastic syndromes

Erik Teske

Cancer patients may present in different ways to a clinician. Often the owner has noticed an external mass in their pet, while the animal is without further complaints. However, frequently the primary tumour is not the reason for the owner to visit their veterinary surgeon, but rather patients are presented for systemic complaints that initially seem unrelated to a tumour. Systemic or metastasized tumours could be the reason for that in oncology patients, but also the presence of so-called paraneoplastic syndromes.

Paraneoplastic syndromes result from indirect effects of tumours due to the production and release of biologically active substances such as hormones, growth factors and cytokines. The immune system may be affected, and autoimmunity, immune-complex production or immune suppression can occur. Occasionally, paraneoplastic syndromes may cause more morbidity than the original tumour itself. By definition paraneoplastic syndromes are unrelated to size or location of the primary tumour or its metastases.

Paraneoplastic syndromes are divided into different categories depending on their target organ. They include endocrinopathies, disorders of haematopoiesis and haemostasis, neuromuscular disorders and cutaneous syndromes. Cancer cachexia is usually treated separately as it affects multiple organ systems.

A timely detection of paraneoplastic syndromes is essential for several reasons:

- They may be the first clinical manifestation of tumour, and early diagnosis may improve the prognosis for the underlying neoplasia
- The severity of the paraneoplastic syndromes can reflect the activity of the tumour cells, and give information on the progressive or regressive nature of the tumour
- The clinical signs caused by a paraneoplastic syndrome could be falsely interpreted as direct effects of the tumour itself or side effects of treatment, and lead to false prognostic considerations
- Paraneoplastic syndromes may affect the general condition of the animal, and significantly alter the prognosis of a specific tumour

The most important paraneoplastic syndromes will be discussed during this presentation.

### KEY LEARNING OBJECTIVES

- Understand the importance of paraneoplastic syndromes in clinical practice
- Recognize the different types of paraneoplastic syndromes and their relationship with certain tumour types
- Understand the pathophysiology of the different paraneoplastic syndromes

### MULTIPLE CHOICE QUESTIONS

1. Paraneoplastic syndromes can often lead to clinical symptoms before a tumour can be detected. There are many different types of paraneoplastic syndromes. Which of the following situations can be defined as a paraneoplastic syndrome?
  - (A) A dog with chronic lymphatic leukaemia has a non-regenerative anaemia due to myelophthisis
  - (B) A dog with a bladder tumour has hypertrophic osteopathy
  - (C) A dog with splenic haemangiosarcoma has ventricular extrasystoles due to metastases in the myocardium
  - (D) A female dog with a large anaplastic mammary carcinoma on the fifth mammary gland on the right side, including enlargement of the ipsilateral superficial inguinal lymph node. The right hind leg is swollen and oedematous
2. Hypercalcaemia is a common paraneoplastic syndrome. Which of the following statements is related to hypercalcaemia as a paraneoplastic syndrome is true?
  - (A) Hypercalcaemia is seen more often in cats with cancer than in dogs
  - (B) Anal sac carcinomas in the dog are the most common cause of hypercalcaemia in the dog
  - (C) Hypercalcaemia is associated with T cell malignant lymphoma in the dog and not with B cell malignant lymphoma
  - (D) PTH-related peptide, which is the cause of hypercalcaemia, is increased in primary hyperparathyroidism
3. Superficial dermatitis is a paraneoplastic syndrome. What is it associated with?
  - (A) Hepatic tumours and diabetes mellitus
  - (B) Renal carcinoma in the German Shepherd Dog
  - (C) The presence of acantholytic cells
  - (D) Administration of cytostatic drugs

# Biopsies: getting good results

Jonathan Bray

## WHY PERFORM A BIOPSY?

A biopsy is indicated to confirm, support or eliminate the diagnostic probabilities for a mass that has been identified from physical examination, radiographic evaluation or laboratory data. The results of a biopsy can be used to determine the likely prognosis for the patient, and to guide optimal treatment options for the patient, including the extent of surgical resection that may be required, and the indication for neoadjuvant or adjuvant therapies.

## WHY NOT PERFORM A BIOPSY?

Many hypothetical contraindications and concerns have been raised *against* performing a biopsy. The potential cost and apparent therapeutic delay associated with a biopsy procedure are common concerns; these are best countered by understanding what is to be gained by the biopsy in terms of improved patient management.

The potential for encouraging seeding of metastatic cells during biopsy of a neoplastic mass is a problem perceived by many clients. Development of metastatic disease is a complex biological process, requiring an interplay between neoplastic cells, the host and the site where a cell has become lodged. Therefore, the biopsy procedure is unlikely to induce metastatic spread of the tumour. However, local invasion (or seeding) of a tumour along biopsy tracts is an important and recognized phenomenon. The impact of biopsy tract seeding can be controlled by ensuring the biopsy specimen is taken from a site which can be completely removed should tumour excision be required subsequently.

## HOW TO PERFORM A BIOPSY

Clinical judgment must be used to decide which is the most appropriate and cost-effective sampling method to employ to ensure as much information about the mass is obtained as possible.

### Cytology: fine-needle aspirate

Diagnostic cytology is an extremely easy and cheap method for obtaining samples from a wide variety of masses and body cavity fluids. Aspiration is so easily performed that it should be the first step in any diagnostic investigation of an abnormal mass/body cavity fluid.

### Histopathology: biopsy

Cytology does not reveal architectural information about the cancer. Also, some cancers may not exfoliate cells sufficiently to enable cytological examination. Architectural information is useful to establish the grade, which can provide a measure of the cancer's aggressiveness, which may influence the prognosis, and as a consequence, the treatment strategy.

- **Incisional biopsy.** Incisional biopsies can be performed with a scalpel, biopsy punches, needle core biopsy instruments, or trephine, using local anaesthetic or with sedation/anaesthesia. Care should be taken not to widely open uninvolved tissue planes that could become contaminated with released tumour cells. With good technique, percutaneous needle biopsy can provide reliable diagnostic information equivalent to a full surgical biopsy
- **Excisional biopsy.** On occasion, complete excision of the mass may be performed without an intervening 'histological' evaluation. Definitive diagnosis and treatment are therefore performed concurrently. Determination of the appropriate surgical margin about the tumour will be based on empirical guidelines

## FUTURE CONSIDERATIONS

An important limitation of current biopsy strategies is the tendency to provide information on outcome for a surgery that has already been performed – providing information in hindsight of a treatment that has already been performed. Cancer surgery would be improved if we had foresight: we need to identify biomarkers that help improve the prediction of the persistent survival of microscopic disease within the tumour margin, or within the surgical margin following excision, allowing treatment to be better targeted to the individual characteristics of the tumour before treatment commences.

## KEY LEARNING OBJECTIVES

- Describe the options for performing incisional biopsies, and discuss why a biopsy may not be indicated for every oncological case
- Recognize the limitations of histological analysis of margins, and understand how to improve
- Define and explain the terms: grade, mitotic index, differentiation and prognostic markers

## MULTIPLE CHOICE QUESTIONS

1. What is the difference between an incisional biopsy and an excisional biopsy?
  - (A) An excisional biopsy will cure the tumour, and avoids the need for a second procedure
  - (B) An incisional biopsy can usually be obtained in a sedated or conscious patient
  - (C) An incisional biopsy will cause a delay in definitive treatment of the tumour, risking a worsening in outcome for the patient
  - (D) An incisional biopsy is rarely representative of the whole tumour, so the results cannot be relied on for treatment planning
2. Which of the following is a reason not to perform an incisional biopsy of a mass before performing surgery?
  - (A) It adds unnecessary expense for the client
  - (B) It risks spreading the tumour, and making the prognosis worse

- (C) It will often not represent the true nature of the tumour
  - (D) It may not change the treatment plan beyond what is determined from cytology and clinical examination
3. Why is histological analysis of the tumour after surgery important?

- (A) It provides confirmation for the owners that surgery was performed
- (B) It brings additional income for the practice
- (C) It provides accurate analysis of the tumour margin to guarantee complete removal
- (D) None of the above

## Pathology reports: what a clinician needs to know

### Erik Teske

Clinicians usually only read the part of the pathology report in which the diagnosis is given and think that this is the absolute truth. They do not realize that this is the conclusion of a thought process in which the pathologist is considering several possibilities and, in the end, selects one of them as the diagnosis. Clues to how sure they are can often be found in the microscopic description section of the report. However, it starts with the description of the macroscopic appearance and the quality of the biopsy specimen or section. In the microscopic appearance section, the thought process of how the pathologist came to his diagnosis is described. Tissue origin and criteria of malignancy are important aspects. If many criteria of malignancy are listed here, then the reliability of the diagnosis of cancer may be much higher, depending on the tissue of origin, than if only few or no malignancy criteria are listed. One should realize that a pathologist can come to a wrong interpretation of the histological features of the tissue, for instance due to the fact that the biopsy is not representative of the underlying lesion, or they can just make a mistake. If a diagnosis is completely different from what the clinician was expecting, then the pathologist should be contacted and the case should be discussed. A good relationship between submitting clinician and pathologist is therefore vital.

To know if the tumour was completely resected is, of course, very important. Often this is reported in the conclusion of the pathology report, but the reliability of this conclusion can only be evaluated if one reads the entire report. A pathologist will only look histologically at a relatively small part of the surgical margins of the tumour and has to select an area of the whole specimen to make his sections for histological evaluation. The clinician can help him by inking interesting areas after resecting the tumour and before putting it into the fixative.

In order to have an idea about the prognosis, several criteria can be found in the pathology report. Of course, the already mentioned completeness of resection is one of them. When lymph nodes are also sent in, information

on the presence of tumour cells or suspected tumour cells in these lymph nodes is important. Other malignancy criteria are growth pattern, including aspects of infiltrating growth, presence or absence of encapsulation, cellular morphology and differentiation, and signs of proliferation of the tumour cells (mitotic index, proliferation markers).

Much more information can be obtained from a histology report than just reading the final conclusion on tumour type. A good and frequent contact with the pathologist will pay off in the clinic when treating cancer patients. But also the pathologist can only perform optimally if an adequate description of the case is provided by the clinician and a good biopsy specimen is delivered. Like Victor Perman mentioned decades ago: *Garbage in, Garbage out!*

### KEY LEARNING OBJECTIVES

- Understanding the magnitude of information that can be taken from the pathology report
- Recognizing the additional information that can be given in addition to the routine pathology report
- Learning to translate the information of a pathology report to the patient in the clinic

### MULTIPLE CHOICE QUESTIONS

1. Which additional staining is characteristic for mesenchymal tumours?
  - (A) Cytokeratin
  - (B) Vimentin
  - (C) Toluidine blue
  - (D) CD18
2. What is the histological grading of a malignant tumour in part dependent on?
  - (A) Completeness of excision
  - (B) Stage of the disease
  - (C) Infiltrative growth pattern
  - (D) Involvement of the regional lymph node
3. What can PARR tests (PCR for antigen receptor rearrangements) be used for?
  - (A) Staging lymphomas
  - (B) Grading lymphomas
  - (C) Immunophenotyping lymphomas
  - (D) Diagnosing lymphomas with more than 95% accuracy

# Is advanced imaging always better?

**Gerry Polton**

For the purposes of this presentation, advanced imaging will be taken to mean computed tomography (CT) and magnetic resonance imaging (MRI). It will be assumed that all practitioners using these modalities can obtain images of high quality.

Optimal decision making in cancer requires an understanding of the patient's burden of disease. Consistently, one of the most significant determinants of outcome is the anatomical extent of disease, what we term clinical stage. There are, of course, other important considerations: cost; risk; compliance and expertise to highlight the main ones. The oncology practitioner must navigate all of these variables when determining the best management strategy for an owner and their pet. If detailed awareness of clinical stage is necessary for decision making, CT imaging provides detail of anatomical sites not ordinarily captured in routine thoracic radiography and abdominal ultrasonography. Performed well, it also provides superior resolution.

MRI lends itself particularly well to investigations of the central nervous system. There are anatomical sites, particularly the nose, which can be imaged well by CT or MRI. If the option of either is available, in oncology we tend to opt for CT because image acquisition is quicker, anatomical detail is more accurate and because CT is superior for pulmonary metastasis detection.

There are significant drawbacks of a reliance on advanced imaging.

- **Data excess:** the practitioner needs to decide what to image. Total body CT is increasingly used in veterinary oncology for metastasis checks. However, if over 2000 individual images are generated, each with multiple anatomical structures to be scrutinized, it is very easy to overlook important changes. Scrutinizing these datasets requires significant time and a great deal of expertise
- **Absence of pathology detail:** imaging simply provides architectural information. Masses can be identified; metastases can be seen. But, nodular changes of uncertain significance frequently arise. Advanced imaging is frequently a prelude to further investigations such as image-guided biopsy
- **Cost/benefit:** CT and MRI typically incur significant costs. Education about the impact of these costs on the feasibility of subsequent therapy is a critical part of the oncology consultation process. These considerations must also take account of unexpected findings, for example, the nodules of uncertain significance alluded to above

- **Geographic miss:** if metastasis checks examine the thorax and abdomen and there is a metastasis to the brain, it will not be identified. If neurological examination is misinterpreted, lesions can similarly be missed. The increased cost of advanced imaging does not protect against these eventualities but it can inflame an interaction if this potential failing is not clearly expressed

Notwithstanding these pitfalls, advanced imaging, CT imaging in particular, has revolutionized veterinary (and human) oncology. Used well, it leads to superior outcomes for patients. It enables better planning of surgery and radiation therapy. It also leads to non-intervention in some patients which would have otherwise experienced unnecessary morbidity.

## KEY LEARNING OBJECTIVES

- Understanding that computed tomography (CT) and magnetic resonance imaging (MRI) provide ancillary information but do not provide all information required for optimal decision making in veterinary cancer
- Familiarity with clinical scenarios in which advanced imaging is desirable
- Knowledge of what procedures to perform prior to undertaking advanced imaging to ensure the best chance of achieving clinical benefit

## MULTIPLE CHOICE QUESTIONS

1. Prior to performing surgery on a 2-cm diameter immunohistochemically high-grade (high ki-67) cutaneous mast cell tumour arising on the caudoventral abdomen, which would be the optimal test to define clinical stage of the tumour?
  - (A) MRI of the abdomen
  - (B) CT of the thorax
  - (C) Whole body CT
  - (D) Abdominal ultrasonography
2. You are presented with a soft tissue sarcoma arising over the right gluteal region in a spaniel. Which imaging strategy would best define the degree of infiltration of the tumour into the neighbouring tissues?
  - (A) MRI
  - (B) CT
  - (C) Ultrasonography
  - (D) X-ray
3. Which is the most common cause of secondary brain metastasis in dogs?
  - (A) Osteosarcoma
  - (B) Mammary carcinoma
  - (C) Haemangiosarcoma
  - (D) Malignant melanoma

## Planning oncological surgery

Jonathan Bray

### WHY IS A PLAN IMPORTANT?

During the development of oncological surgery over many decades, surgeons in both human and veterinary fields have been driven to take wider and wider excision margins about the tumour in the belief that 'more must be better'. As we gain a greater understanding and interest in cancer management, these relatively dogmatic treatment strategies are justifiably being reviewed.

This does not mean it is fine to take smaller margins. It does mean the clinician has to have a greater understanding of the mass before embarking upon treatment as a single rule for treatment does not exist for every tumour.

It is well established that the first attempt made at treatment of a tumour will be the optimum opportunity to achieve the best outcome for the patient. If this first treatment is inadequate or poorly focused, subsequent 'mop-up' treatments – including radiotherapy, chemotherapy or additional surgery – are more likely to fail. Treatment failure may include increased prospects for both local or systemic recurrence.

### WHAT IS MEANT BY A PLAN?

There are two important aspects of a treatment plan:

- What is the purpose and intent of treatment? Is a cure possible? Or will cure be impossible, even with heroic efforts. In the latter event, can any treatment achieve palliation of the tumour effects sufficient to restore an acceptable quality of life, and for an acceptable duration
- How is this goal achieved, and what are the sacrifices the patient must make to meet this goal? Is failure going to be due to local recurrence, or due to spread of the tumour to regional nodes or beyond

### DEVELOPING A PLAN

#### Understand the mass

Before any treatment plan can be determined, the biological potential of the mass must be understood. Is the mass neoplastic, and if so, what is its tendency for local invasion, locoregional metastasis and distant metastasis? In most instances, this information can be gained by fine-needle aspiration alone. If this proves non-diagnostic or inadequate, a biopsy may be required for histological analysis (see **Biopsies: getting good results**, elsewhere in this proceedings).

#### Discussion with owners – expectations, finances and realities

An essential aspect of tumour management is involving the owners in developing the treatment plan. The goals of the treatment plan need to be agreed and understood,

particularly if compromises are being made to an ideal solution due to finances, apparent comorbidities or other factors. If the tumour is large, located in a difficult location or showing attributes that suggest an aggressive behaviour, early discussion with a specialist oncological surgeon is advised.

### Role of imaging

Imaging is an increasingly important in tumour management. Imaging serves two purposes:

- It helps assess if the tumour has spread beyond the local site (i.e. staging)
- It can assist with recognizing tumour boundaries and the tissue barriers necessary for effective surgical excision

### A role for combination therapy

While surgery remains the more effective weapon against localized cancer, the planned incorporation of chemotherapy or radiotherapy can provide improved or similar outcomes for selected patients with less morbidity or risk of complications. The timing of these additional interventions will differ for certain tumours.

### KEY LEARNING OBJECTIVES

- Recognize the role of tumour genetics and the microenvironment on cancer progression and prognosis, and the influence of this on treatment planning for the individual patient
- Understand the differences and possible impact of an unplanned excision, versus a curative-intent excision, a planned marginal excision and palliative care
- Understand the followings terms and their role in cancer management: staging, sentinel node, neoadjuvant, adjuvant, survival curve, curative-intent, cytoreduction, palliation

### MULTIPLE CHOICE QUESTIONS

1. What is the purpose of a treatment plan in cancer?
  - (A) To ensure that owners understand that cancer is a difficult disease, and recurrence is possible
  - (B) To draw lines on the patient with sterile marker pen prior to surgery
  - (C) To identify the goal of treatment for each individual patient, and devise a treatment solution that best meets this goal
  - (D) To provide a structured clinical report that your colleagues can understand in your absence
2. What does a treatment plan help recognize?
  - (A) Every tumour is individually unique, and generic application of a surgical ruler may lead to under- or over-treatment of a tumour
  - (B) Unplanned excisions of a tumour can be associated with increased rates of

treatment failure. Post-hoc use of chemotherapy and radiotherapy may not always overcome these failings

- (C) Identification of tissue barriers using imaging prior to surgery can reduce surgical morbidity
  - (D) All of the above
3. Which of the following statements about removal of the regional lymph node is INCORRECT?
- (A) Histological analysis of the regional lymph node is more accurate at detecting micrometastasis than cytology

- (B) The regional node is considered important in directing the immune response to the tumour, and should be removed only if completely effaced by tumour
- (C) Lymph node mapping may be important to help detect the draining site for a specific tumour, and improve accuracy of staging
- (D) Removal of a positive lymph node can result in improved survival times for many cancers, so patients with a draining lymph node metastasis should not be considered to have a hopeless prognosis

## Chemotherapy: the basics

**Erik Teske**

Surgery is still the cornerstone of treatment of most cancers. Most patients with cancer that are cured, are cured because of surgery. Chemotherapy, radiotherapy and other treatment modalities may extend life, but only cure a very small proportion of treated patients. In most instances they are used in a more palliative setting and meant to give the patient a prolonged, preferably tumour-free, survival time.

In systemic tumours and in proven or suspected metastasized tumours, chemotherapy can be indicated. It is therefore essential for all practitioners to know about these treatments, their possibilities and their limitations. There are many reasons why chemotherapy is unlike normal conventional drug therapy and that it will require investment in material, equipment, additional knowledge and time. In this lecture the basic requirements for starting chemotherapy in private practice will be discussed.

Different tumours require different cytostatic drugs, often used in combination protocols. It is essential to know the right (sub)type of tumour before chemotherapy is started. Also additional information on the health state of the patient needs to be collected. Several drugs have organ-specific toxicities, or need to be activated or excreted by specific organs.

Knowledge about the different cytostatic drugs, their mode of action, their specific toxicities and their dosage is essential. Most tumours will become resistant towards the chemotherapy. Knowledge about the different mechanisms of this resistance is important in order to find alternative treatments.

Although chemotherapeutic drugs treat cancer they can also cause cancer. They are hazardous drugs for owner, veterinary surgeon and technician. The veterinary surgeon has to be aware of the different routes of potential contamination, not only during the preparation and administration of these drugs, but also through the patient itself. Owners need to be informed of this risk, and practice staff must be informed and trained. Investments

have to be made in the clinic in order to be able to administer these drugs.

### KEY LEARNING OBJECTIVES

- Knowing the indications and limitations for chemotherapy
- Learning to score the efficacy and side effects of chemotherapy
- Learning to prepare and administer cytostatic drugs, including awareness of the environmental hazards of chemotherapy

### MULTIPLE CHOICE QUESTIONS

1. What is the Veterinary Cooperative Oncology Group (VCOG) toxicity score used for?
  - (A) To stage the patients before the start of chemotherapy for the risk of side effects of chemotherapy
  - (B) On the day of chemotherapy administration to see if dose adjustments are necessary
  - (C) Assessing haematological and biochemical indices
  - (D) To grade maximal toxicities after chemotherapy has been administered
2. Doxorubicin is a cytostatic drug. What is its mode of action?
  - (A) Inhibition of the spindle apparatus resulting in metaphase arrest
  - (B) Conversion of asparagine into aspartic acid
  - (C) Creating complexes with DNA/RNA (intercalation)
  - (D) Being an analogue of normal metabolites involved in cell division or cell function
3. With regards to the environmental hazards of cytostatic drugs it is important to know the period of the patient will be a risk for its surroundings. For how long does a dog treated with doxorubicin have elements of this drug in its urine?
  - (A) 1–2 days
  - (B) 3–4 days
  - (C) 4–7 days
  - (D) More than 1 week



## Oncology treatments: new and on the horizon

Gerry Polton

### NEW TREATMENTS

Human cancer therapy continues to move apace and it is exciting to say that veterinary cancer therapy isn't doing too badly either. Tyrosine kinase inhibitors and metronomic chemotherapy are relatively new treatments that we will discuss briefly. As some will be familiar with these treatments, I will focus on new knowledge and our current understanding of their best uses.

Electrochemotherapy involves the anatomical targeting of chemotherapy delivery to cancer cells by the direct application of a specifically shaped electrical field. Chemotherapy is introduced to the tumour field by intravenous or intratumoral injection. Application of the electrical field then permeabilizes the cancer cells, causing a marked increase in drug delivery to the targeted tissue. Clinical indications include injection site sarcoma in cats, soft tissue sarcoma in dogs, facial squamous cell carcinoma in cats among others.

### NEW HORIZONS

The field of cancer immunotherapy is developing rapidly. Trials are currently underway for dendritic cell vaccination for canine malignant melanoma, chimaeric antigen receptor (CAR) T cell therapy for treatment-resistant B cell lymphoma and monoclonal antibody therapy for dogs with T cell lymphoma, to list a few. However, the most likely immunotherapy to reach clinical practice soon is a CD20 vaccine for canine B cell lymphoma. In principle, vaccination is performed once complete remission has been achieved using conventional chemotherapy. In the context of minimal residual disease, immune tolerance of the lymphoma is overcome and the vaccine induces a lasting memory effect. Trials are ongoing. The current obstacle to use is a need to define the optimal timing of vaccine administration in relation to chemotherapy delivery.

Away from the field of immunotherapy, an imaginative solution to the perpetual problem of intractable pain associated with appendicular limb osteosarcoma in large- and giant-breed dogs comes in the form of an irreversible pain receptor toxin, resiniferatoxin. This agent, when injected intrathecally, causes permanent loss of C fibres in the dorsal root ganglion but does not induce a loss of other sensory functions.

### KEY LEARNING OBJECTIVES

- Be familiar with best practice in relation to the use of tyrosine kinase inhibitors
- Be aware of clinical indications for and risks of metronomic chemotherapy
- Be invigorated by the extraordinary therapeutic possibilities that are just over the horizon in veterinary oncology

### MULTIPLE CHOICE QUESTIONS

1. Tyrosine kinase inhibitor therapy is indicated in which of the following?
  - (A) All mast cell tumours
  - (B) All cancers
  - (C) All mast cell tumours for which owners decline chemotherapy
  - (D) Selected mast cell tumours
2. Metronomic chemotherapy involves the daily administration of agents believed to have an anti-angiogenic effect, thus limiting the ability of new cancer cells to grow. What other anti-neoplastic mode of action is attributed to low daily doses of cyclophosphamide?
  - (A) Sterile haemorrhagic cystitis
  - (B) De-repression of immune surveillance and activation
  - (C) Altered signal transduction pathways
  - (D) Mitochondrial failure
3. How are we going to cure cancer once and for all?
  - (A) Stronger chemo drugs
  - (B) Braver surgeons
  - (C) Immunotherapy
  - (D) We are not going to cure cancer once and for all

Thursday 4 April  
Hall 7

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# Exotics

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**Reptile diagnostic imaging**  
Paolo Selleri

## Updates on rabbit medicine and surgery

Christoph Mans

### BLOOD BIOCHEMISTRY

Blood biochemistry evaluation is one of the most important diagnostic tests in critically ill rabbits, besides diagnostic imaging. Rabbits are frequently presented for evaluation of sudden-onset anorexia and lethargy. Possible underlying causes include stress and underlying disease process or pain. It can be challenging to identify the correct underlying cause in rabbits and this may result in the misdiagnosis of potential life-threatening conditions, such as gastrointestinal obstruction or liver lobe torsion. Blood biochemistry offers a simple and cost-effective way to rule out important underlying diseases in a short period of time. In most clinics, these tests can be performed in-house and allow the veterinary surgeon to provide the best possible treatment options for rabbit patients.

### THYMOMAS

Thymomas are the most common neoplasm of the thoracic cavity in rabbits, and are increasingly diagnosed in older rabbits. Rabbits usually present with a history of bulging eyes, reduced activity or increased respiratory rate. Less commonly problems swallowing or choking may be reported by the owner. Physical examination can be unremarkable or may reveal bilateral exophthalmos, a heart murmur, tachypnoea, or dyspnoea. Thoracic radiographs will reveal an intrathoracic soft tissue mass, dorsal deviation of the trachea and displacement of the heart. However, it may be difficult to distinguish a thymoma from cardiomegaly in some cases. Therefore, thoracic ultrasonography or computed tomography are required to confirm the diagnosis of an intrathoracic mass. The diagnosis of thymomas is made by cytological evaluation of a fine-needle aspirate of the mass. Treatment options for thymomas in rabbits include radiation therapy or palliative medical therapy with prednisolone. Often surgical therapy is not recommended due to the high risk of intraoperative and postanaesthetic complications.

### LATERAL RHINOSTOMY

Lateral rhinostomy is a useful technique that has shown to effectively resolve upper respiratory tract disease of

rabbits. This technique is associated with considerably less trauma and faster recovery times than is the dorsal rhinostomy approach and is indicated for rabbits with chronic unilateral sinusitis, in which medical treatment has failed to improve clinical signs.

### KEY LEARNING OBJECTIVES

- Become confident interpreting plasma biochemistry values in critical rabbit patients and ruling out life-threatening conditions
- Recognize the clinical signs associated with thymomas in rabbits and be able to discuss different treatments options
- Understand when surgical treatment for chronic upper rhinosinusitis is indicated and what the differences are between published surgical techniques

### MULTIPLE CHOICE QUESTIONS

1. Which of the following is TRUE regarding liver lobe torsion in rabbits?
  - (A) Affects only young rabbits (<2 years)
  - (B) Abdominal radiographs and physical examination are able to confirm liver lobe torsion in most cases
  - (C) Surgical treatment is not recommended, due to the high risk of complications
  - (D) A substantial increase in liver enzymes is highly suggestive of liver lobe torsion
2. Which of the following is TRUE about thymomas in rabbits?
  - (A) Highly responsive to radiation therapy
  - (B) Only reported in rabbits >12 years
  - (C) Not reported in Rex rabbits, since this breed lacks a thymus
  - (D) The cause of unilateral and bilateral exophthalmos
3. Why are blood glucose levels in rabbits of high diagnostic value?
  - (A) Diabetes mellitus is very common in obese rabbits
  - (B) Severe hyperglycaemia is highly suggestive of a painful abdominal disorder, such as an intestinal obstruction
  - (C) Hypoglycaemia is usually associated with insulinomas in rabbits >4 years of age
  - (D) Hypoglycaemia is commonly associated with stress and dental disease

# Sedation, analgesia and anaesthesia in small mammals

**Christoph Mans**

## PROCEDURAL SEDATION

Procedural sedation is defined as the state of drug-induced altered consciousness, which allows the patient to better tolerate stressful or unpleasant procedures, without depressing protective airway reflexes or having a significant cardiopulmonary depressant effect. Since most small mammal species are prey species, they are less tolerant to handling, manual restraint and other stressful or painful procedures. In particular, in small mammals in respiratory distress, sedation should be considered prior to prolonged manual restraint, for example for radiographic positioning. A variety of drugs can be used to induce effective sedation in small mammals. Some of these drugs have sedative, anxiolytic and amnesic properties (e.g. midazolam), while others have mainly analgesic and sedative properties (e.g. butorphanol). The combination of two drugs (e.g. midazolam with butorphanol) usually results in better sedation with fewer side effects, as compared to using a single drug at a higher dose. Most drugs used for sedation can be reversed, which allows for a more rapid recovery from sedation. Drugs, which cannot be reversed (e.g. ketamine) should be used at low doses only, in particular in animals with reduced liver and/or kidney function. Oxygen flow-by should always be provided, since most sedation protocols will result in a reduction of respiratory rate. Effective sedation protocols are species specific, and therefore extrapolation from one small mammal species to another does usually not result in satisfactory sedation. In addition, postanaesthetic reduction in food intake and faecal output have been demonstrated in small mammals.

## ANALGESIA

Analgesia of small mammals is a focus of recent research studies. With more research being performed, analgesic protocols, previously believed to be effective, which were based on extrapolation and clinical experience, have been questioned for their efficacy. A variety of drugs including buprenorphine, tramadol, meloxicam and lidocaine have been investigated. Species-specific differences in drug dose requirements, dosing frequency and drug efficacy should be considered when considering a pain management plan for small mammal patients.

## GENERAL ANAESTHESIA

General anaesthesia in small mammals, is routinely performed by many veterinary surgeons for a variety of

elective and non-elective procedures. Recent developments in anaesthetic protocols and anaesthetic equipment are aimed to reduce morbidity and mortality associated with general anaesthesia in small mammal patients.

## KEY LEARNING OBJECTIVES

- Understand the basic principles of and indications for procedural sedation in small mammals
- Formulate effective sedation protocols for a variety of small mammal species
- Be able to formulate different pain management plans for rabbits, guinea pigs, chinchillas, ferrets and hedgehogs

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is TRUE regarding sedation in small mammals?
  - (A) Due to their fast metabolism, injectable sedation protocols are usually not effective in small mammals
  - (B) Midazolam, if used as part of a sedation protocol, should not be reversed in rabbits in order to avoid excitation during the recovery phase
  - (C) Midazolam–butorphanol provides safe and effective sedation in ferrets
  - (D) Single-drug sedation protocols are generally preferred in small mammals, due to the reduced risk of cardiovascular adverse effects
2. Which of the following has been shown for tramadol?
  - (A) It is an effective analgesic in rabbits but not in guinea pigs
  - (B) It is ineffective as an analgesic drug in chinchillas
  - (C) It has a narrow margin of safety in ferrets
  - (D) It has long-lasting effects in guinea pigs at 5 mg/kg orally
3. Which of the following statements regarding buprenorphine is CORRECT?
  - (A) Duration of effects in guinea pigs and chinchillas is >8 hours
  - (B) Doses >0.1 mg/kg lead to profound sedation in chinchillas
  - (C) Oral–transmucosal administration can lead to therapeutic plasma levels
  - (D) A dose rate of 0.05 mg/kg has been shown to result in analgesia in chinchillas for 6–8 hours

## Managing chelonian shell disorders

**Christoph Mans**

The shell in turtles and tortoises represents unique challenges to veterinary surgeons in regards to the diagnosis and treatment of coelomic organ disorders. In addition, the shell itself can be affected by a variety of infectious and non-infectious disorders.

Pyramiding and other forms of shell deformation in chelonians are usually seen only in captivity. Different underlying causes have been proposed in the past, including dietary causes and lack of UVB light. Only low humidity has so far been clearly shown to predispose to pyramiding of the shell. It is believed that focal heat lamps also contribute to the development of pyramiding. The keratin layer of the most dorsal aspects of the shell is drying out, because they are in the closest proximity to the heat lamps. This in consequence leads to interference with the growth of the underlying bone, resulting in a domed appearance of the dorsal aspect of carapace. Pyramiding in many cases has no consequences for the tortoise and is considered a cosmetic problem. However, in severe cases, the shell deformation may lead to compression of the spinal cord. In order to prevent pyramiding, heat lamps should create a wide area of heat, instead of a narrow focal heat spot. Regular soaking and applying water to the carapace may assist in preventing dehydration of the keratin. Exposure to natural sunlight is strongly preferred over artificial heat sources whenever possible.

Shell fractures can be a result of predator trauma, falls, drops or mechanical trauma (hit by car, lawnmower, etc.). Often the shell damage can be quite striking on initial examination, but still carry a good prognosis depending on the area of damage and the patient's overall condition. Establishing the extent of injury, supportive care and stabilization are the priorities. Surgical shell fixation should be delayed until the patient has been stabilized. If there is penetration of the coelomic cavity, degree of blood loss and damage to internal organs should be assessed prior to performing surgical shell repair. If there is a wound or fracture across the spinal column, or the patient is having difficulty ambulating, radiographs or computed tomography scans should be obtained. Fluid therapy, antibiotics and analgesics should be given before further treatment is attempted. Different techniques have been proposed for the stabilization of shell fractures. The author recommends the use of metal plates and stainless steel screws, in order to achieve fracture stabilization. Open wound management should be performed for larger defects.

Shell infections are usually secondary to trauma or poor husbandry. Besides bacterial infections, filamentous

fungal organisms should always be considered in chelonians presented for deep shell infections. Cytology or, if non-diagnostic, histopathology should be performed in all cases, in order to rule out the involvement of fungal organisms in the shell infection. Treatment of shell infections depends on severity and species affected, and usually consists of surgical debridement, as well as topical and, if deemed necessary, systemic antimicrobials.

### KEY LEARNING OBJECTIVES

- Understand the basic principles of shell fracture stabilization and wound management
- Be able to discuss the different proposed aetiologies for shell deformations in captive chelonians
- Develop a diagnostic and therapeutic plan for a turtle patient which presents with shell lesions consistent with a deep shell infection

### MULTIPLE CHOICE QUESTIONS

1. Which of the following is TRUE regarding shell fracture healing in chelonians?
  - (A) Shell fractures heal very slowly and usually take 3–4 months
  - (B) All turtles with shell fractures require dry-docking until healing is complete
  - (C) Use of metal plates, screws and wire is the preferred method for surgical fracture stabilization
  - (D) Epoxy-type products should be used to seal shell fractures in order to achieve stabilization and protection from infection
2. Which of the following is CORRECT regarding management of shell infections?
  - (A) Antifungal drugs should be given to all patients with suspected shell infections, due to the high risk of fungal infections
  - (B) Inappropriate substrate is not a common cause for infections of the plastron
  - (C) Shell debridement should not be performed, as it will disseminate infection into deeper shell layers
  - (D) Ceftiofur is an excellent antibiotic choice to empirically treat a bacterial shell infection in an aquatic turtle
3. In which of the following species and housing conditions is shell pyramiding most likely to occur?
  - (A) Red-eared slider, housed indoors
  - (B) Russian tortoise, housed outdoors
  - (C) Greek tortoise, housed indoors
  - (D) Soft-shell turtle, housed indoors

# Avian clinical techniques

Christoph Mans

## BLOOD COLLECTION

Blood collection in avian patients can be performed safely in most patients, however, excellent manual restraint techniques are mandatory in order to avoid complications. The right jugular vein is the most commonly used blood collection site. This vein is usually easily visualized and allows for the collection of larger blood volumes, compared to other sites. The ulnar vein should be avoided unless the patient is anaesthetized, due to the high risk of haematoma formation at this site. The medial metatarsal vein can also be used, but the ability to obtain a diagnostic blood sample from this site varies by bird species. In chicken, waterfowl and raptors this vein is a reliable blood collection site. Approximately 1% of a bird's bodyweight in grams can safely be collected in ml of blood. For example, in a 100-g cockatiel, 1 ml of blood can be collected. Lithium heparin is the preferred anticoagulant for avian blood.

## SEDATION

Sedation provides tremendous benefits for avian patients, including stress relief, anxiolysis and amnesia. Sedation allows for more thorough examination and safer sample collection and minimizes the need to use general anaesthesia in order to complete diagnostic and non-painful therapeutic procedures. Midazolam and midazolam–butorphanol sedation protocols are most commonly used and have been shown to provide safe and effective procedural sedation in variety of species. However, drug dosages need to be adjusted based on the species, patient condition and procedures to be performed under sedation. Reversal of midazolam with flumazenil should be performed in most cases, in order to avoid prolonged recovery. Midazolam, butorphanol and flumazenil can be given by intramuscular injection or by intranasal administration.

## FLUID THERAPY

Fluid therapy is essential in systemically sick birds, which are usually dehydrated. In most cases, with the exception of hypovolaemic shock and severe dehydration, the subcutaneous route is recommended. A subcutaneous fluid bolus of 3–5 ml/100 g bodyweight can be safely administered. The bird's hydration status should be monitored, and the fluid administration repeated until euhydration is achieved. Intraosseous catheters are particularly useful in psittacine as well as smaller bird species, in which access for and maintenance of an intravenous catheter are challenging. In larger birds, such as chickens and waterfowl, intravenous catheters can be placed and maintained in the medial metatarsal vein for intravenous fluid and drug administration.

## EXTERNAL COAPTATION

External coaptation is a feasible and successful treatment option for a variety of fractures in captive birds. Tibiotarsal fractures are the most common fracture in small cage birds and are successfully treated with the application of a tape splint. Fracture healing occurs usually within 21 days. In cases in which a predator attack (dog, cat) was reported or in which deep pain was not present on presentation, the chance for a successful outcome is lower. Tape splints should only be removed if complications are noticed, otherwise they should remain in place for 14–21 days, in order to avoid disruption of the healing fracture site.

## KEY LEARNING OBJECTIVES

- Become comfortable selecting sedation protocols for common pet bird species
- Understand when external coaptation is the feasible treatment option for fractures in birds
- Be able to recommend the appropriate blood collection sites and volumes for a variety of bird species

## MULTIPLE CHOICE QUESTIONS

1. You decide to run a complete blood count and plasma biochemical profile on a 30-g budgerigar. What is the maximum volume of blood that you can safely collect from this patient?
  - (A) 2.5 ml
  - (B) 0.03 ml
  - (C) 0.6 ml
  - (D) 0.3 ml
2. Which of the following sites can be used for intraosseous catheterization and fluid administration in birds?
  - (A) Distal humerus
  - (B) Proximal tibiotarsus
  - (C) Proximal femur
  - (D) Coracoid
3. Which of the following statements regarding avian sedation is CORRECT?
  - (A) Midazolam and diazepam should never be administered by intramuscular injection
  - (B) Sedation protocols which include butorphanol should always be reversed with naloxone
  - (C) Midazolam–butorphanol protocols provide deeper and more reliable sedation compared to midazolam protocols
  - (D) Sedation should never be performed in sick avian patients, due to the high risk of complications



## Clinical applications of rabbit endoscopy

Paolo Selleri

Rigid endoscopy is a versatile tool for diagnostic and treatment in rabbit medicine. Its broad spectrum of use includes stomatoscopy, otoscopy, cystoscopy, thoracoscopy and even laparoscopy. Due to the fact that it allows clear visualization of the internal organs and magnification of the images, it can be applied to study and to treat various systems (respiratory, digestive, urinary and reproductive), it enables collection of samples for culture, cytology or pathology and can also be used as a tool for the veterinary surgeon to improve communication with clients, by showing them pictures and videos that are easy to understand.

The 2.7-mm endoscope, 18 cm long, with a 30-degree angle is the most widespread endoscope in exotic animal medicine. The 30-degree angle is especially useful in stomatoscopy of rabbits presented for hypersalivation. When the physical examination of the conscious rabbit does not give enough information the animal can be sedated to better visualize teeth and oral soft tissues. Other than dental diseases, hypersalivation can be caused by a foreign body stuck between two teeth or a neoplastic lesion. These conditions could be missed without the use of an endoscope. Furthermore, the endoscope can assist for simple procedures, like mass resection, and also more complex ones, like extraction of a molar tooth, for visualizing the anatomy and better evaluation of whether another condition is present.

When performing oral examination and surgery, it is always important to have the animal intubated. This is safer for all surgical procedures, particularly because a large number involve the rabbit's head and a face mask is an impediment for the surgeon. Moreover, the use of a face mask does not allow complete monitoring of anaesthesia as capnography cannot provide reliable results in these circumstances. Many methods have been described for endotracheal intubation. The endoscope makes intubation faster and safer. You can use the endoscope by placing it into the endotracheal tube or, if you prefer, you can pass it through the mouth and assist the placement of the tube in the trachea by watching the glottis. It is not unusual to find food at the opening of the trachea! The use of a blind intubation technique may be risky, because we may push the food from the pharynx deep into the trachea or to the bronchi. This may cause suffocation during anaesthesia or aspiration pneumonia a few days after the procedure.

Almost all rigid endoscopic techniques applied in small animal medicine can be adapted for rabbits, but one

in particular, which is very useful, is to diagnose and to treat urinary tract diseases. Intestinal calcium absorption in rabbits is not reduced in the case of excessive calcium intake, but urinary calcium excretion is increased. It is thought that dietary calcium is one of the major causes of urolithiasis. Polypoid cystitis is often not diagnosed if the urethra is not directly visualized. The endoscope is also essential in the removal of small stones and sludge. The presence of sludge into the bladder is a common condition and it is often the cause of discomfort and cystitis, with a cat urinary catheter being often too thin to allow the passage of the sludge. Only the use of the endoscope placed in its protective sheath allows visualization of the bladder wall and removal of the sludge.

### KEY LEARNING OBJECTIVES

- Understand how the endoscope can be applied every day to clinical practice in rabbit medicine
- Learning how endoscopy can guide the endotracheal tube entering the trachea
- Discuss benefits of rigid endoscopy to diagnose and treat lower urinary tract diseases

### MULTIPLE CHOICE QUESTIONS

1. Which of the following can occur as a result of blind intubation?
  - (A) Oedema and laryngospasm consecutively
  - (B) Complications associated with aspiration pneumonia
  - (C) Potentially lead to spinal lesions due to the extreme positioning of the animal
  - (D) All of the above
2. Endoscopy is useful for removing sludge and calculi from the urinary bladder. What is this common disease caused by?
  - (A) The fact that intestinal calcium absorption rate in rabbits is reduced in the case of excessive calcium intake
  - (B) The fact that increased calcium intake will increase urinary calcium excretion
  - (C) The fact that older animals are not able to excrete calcium
  - (D) The fact that rabbits are commonly fed salad, which has a high calcium concentration
3. When performing cystoscopy in a rabbit, what medium should be used to distend the bladder?
  - (A) Cold sterile solution
  - (B) Warm sterile solution
  - (C) Air
  - (D) Carbon dioxide

# Clinical applications of reptile endoscopy

**Paolo Selleri**

A reptile's anatomy may limit the usefulness of the physical examination. Furthermore, haematology and biochemistry may not give clear information regarding the pathology involved. The use of the rigid endoscope (18 cm long, 2.7 mm diameter, 30-degree angle) allows for more accurate evidence-based diagnosis, offering more information and increasing the standards of care. Endoscopy of the coelomic cavity and organ biopsies are often necessary to reach a definitive diagnosis.

Several techniques have been developed to explore the coelomic cavity of these species.

For ophidians, often presented for respiratory disease, endoscopic examination of the lung is an important diagnostic tool for the thorough evaluation of the respiratory tract. Although tracheoscopy has its limits, for example in large snakes the length of the lower respiratory tract or in smaller ones the diameter of the trachea (the endoscopes are too large for examination), lung and air sacs can be investigated and samples can be collected performing a transcutaneous approach. For this technique, the skin is incised on the right side, on the second row of scales approximately at the 40% of the length of the body. Scissors are then bluntly advanced through the subcutaneous and muscular tissue. The respiratory tract is then incised and the endoscope directed both cranially and caudally, for complete exploration of the air sac. The 30-degree angle makes better visualization possible, without a lot of movement of the telescope.

For chelonians, often presented for traumatic lesions of the shell, the endoscope should be used to investigate every lesion that exposes the coelomic cavity. Haemorrhage is not easy to diagnose using radiography or ultrasonography, rupture of organs is easily missed without the use of an endoscope; besides that, fly larvae hidden in the soft tissue can be identified and physically removed.

Assisted surgical procedures can also be performed in these species. Ovaries and oviducts can be easily identified, grasped, and placed in the surgical field, the prefemoral fossa. It is important to remember that the lungs and air sacs are not separated with a diaphragm, so the need for insufflation depends on the anatomy of the patient and the area of interest.

Another valuable diagnostic tool is cystoscopy in chelonians. The two main features of the chelonian urinary bladder, anatomy and size, play an important role in choosing this technique. The fact that the urinary bladder wall is thin and transparent when distended and it is a greatly distensible organ that can accommodate large quantities of fluids (i.e. up to 30% of the total body weight of the chelonian), make it a reliable procedure that can help the veterinary surgeon visualize internal organs and have a better understanding of the clinical case, especially when other diagnostic techniques are not helping. The urethra is short and wide so an endoscope can be passed easily. It can be used for sex determination of hatchling chelonians, often requested from reptile breeders, and also to visualize the intestinal tract, pancreas, liver, spleen and, of course, the bladder wall itself and its content (urinary stones, eggs and parasites can be identified). Performance of biopsies is not possible via this route.

## KEY LEARNING OBJECTIVES

- Understand how the rigid endoscope can improve the level of care offered to our reptile patients
- Highlight how this instrument improves communication with clients
- Understand the application for non-invasive sex determination in hatchling chelonians

## MULTIPLE CHOICE QUESTIONS

1. What is the best endoscope to perform cystoscopy in a tortoise?
  - (A) Rigid endoscope, 30-degree angle
  - (B) Rigid endoscope, 0-degree angle
  - (C) 5-mm large flexible endoscope
  - (D) An otoscope is reliable
2. Laparoscopy-assisted surgical techniques are most commonly used in which of the following?
  - (A) Crocodilians
  - (B) Lizards
  - (C) Snakes
  - (D) Chelonians
3. What are the limitations of endoscopy in snakes related to?
  - (A) Size and length of the telescope
  - (B) Size and length of internal organs
  - (C) Specific anatomy of these species
  - (D) Lack of diaphragm and possibility of insufflation

# Top tips for ferret surgery

**Paolo Selleri**

Many common disease syndromes of pet ferrets often require surgical treatment. Young ferrets enjoy chewing on and are more frequently exposed to the ingestion of

foreign bodies such as rubber, cork, and occasionally cloth. When the obstruction is only partial the ferret may show signs of discomfort, intermittent anorexia and vomiting, but faeces are still produced. History, gentle palpation of the abdomen, and diagnostic imaging are necessary to locate the foreign body. Most ferrets have a relaxed abdomen that makes objects easy to palpate when they are in the intestine. When these objects are stuck in the stomach they can be more difficult to palpate. Radiography may reveal direct signs of obstruction (the foreign body) or, more frequently secondary

signs (gas pattern). Surgical procedures of the gastrointestinal tract should follow those guidelines for cats. Due to the fact that ferrets are often presented with multiple conditions, before starting an abdominal surgical procedure it is always recommended to perform a complete ultrasonography of the abdomen.

Some of these concurrent diseases, especially in older ferrets, are neoplastic. The most frequently encountered are insulinomas, adrenal gland carcinoma, skin mast cell tumours and lymphoma. Surgical excision and staging can be recommended for most cases, but in the case of lymphoma, chemotherapy is recommended.

Ferrets are strictly carnivorous mammals and they have acidic urine. When their diet is rich in vegetables the urine pH rises and sand or calculus can be found in the urinary tract. Cystotomy and urethrostomy (in the male) are the most common surgical procedures and the techniques are similar to those used in small animals.

## KEY LEARNING OBJECTIVES

- Understand the right approach to the surgery of an animal with a small body size
- Discuss the different options when dealing with neoplastic diseases
- Learning the fastest techniques to safely remove an enlarged spleen

## MULTIPLE CHOICE QUESTIONS

1. In which of the following neoplastic diseases is surgery contraindicated?
  - (A) Skin mast cell tumour
  - (B) Insulinoma
  - (C) Lymphoma
  - (D) Adrenal gland adenoma
2. What is the biggest concern regarding adrenalectomy in ferrets?
  - (A) Risk of life-threatening haemorrhage when performing left adrenalectomy
  - (B) Risk of life-threatening haemorrhage when performing right adrenalectomy
  - (C) Acute kidney damage
  - (D) Pancreatitis
3. Which of the following is correct with regard to partial pancreatectomy?
  - (A) It is the treatment of choice in localized insulinomas
  - (B) It is used in conjunction with medical treatment including diazoxide
  - (C) Both (A) and (B) are incorrect
  - (D) Both (A) and (B) are correct

# Reptile diagnostic imaging

**Paolo Selleri**

A deep knowledge of the anatomy, physiology and pathology of the species being investigated is mandatory for the correct interpretation of diagnostic imaging.

Radiography is the first resource used in herpetological medicine. Skeletal fractures are often found in reptiles kept in captivity. They are usually assessed by means of plain radiographs. The clinician should be aware that, in reptiles, the fracture-healing process involves a mixture of fibrous tissue and osseous callus; therefore, clinical fracture stability occurs a long time before radiographic healing becomes evident. Metabolic bone diseases are also extremely common, but radiographic visualization of the bone loss is only possible when loss of density is greater than 40%.

Other than skeletal disorders, radiography can rapidly identify gastrointestinal disorders (dilatation, foreign body obstruction), coelomic conditions, neoplasia or reproductive problems. Especially in chelonians and lizards, follicular stasis or dystocia can be diagnosed via this imaging technique.

In lizards (such as iguanas or chameleons), another frequently encountered condition is renal disease. Enlargement of the kidneys can be seen on the lateral view. Secondary signs of kidney disease can be dilatation of the intestinal tract, secondary to the enlargement of the kidneys that can impede the passage of faeces

through the pelvic canal. The kidneys lie in the pelvic area and can be visualized via a dorsal approach just cranial to the iliac bones.

In chelonians horizontal radiographic beam orientation and horizontal positioning (lateral and craniocaudal) are often necessary to reduce errors in radiographic interpretation due to superimposition of the lung, bladder and internal organs on vertical views.

Although radiography is still very often used as the most common imaging technique in reptiles, ultrasonography and computed tomography (CT) scanning are gaining ground, due to the fact that they can be used to evaluate any system in a reptile: the heart, liver, gallbladder, urinary bladder, intestine and reproductive tract.

Reptiles with thick and calcified scales can be problematic for ultrasonography due to artefacts caused by air pockets between the scales. Giving the patient a warm bath prior to investigation will reduce the potential air pockets, as will spraying the patient with water prior to applying the ultrasound gel. Animals undergoing ecdysis can also be problematic to scan due to the air between the old and the new skin layers. In small patient a water bath can be used with the transducer submerged below the surface.

Lizards can be placed in dorsal recumbency with the probe directed downwards or held in ventral recumbency with the probe directed from below. The ventral body wall is the main approach and provides information on the majority of the coelomic organs.

In young chelonians or soft-shelled subjects, scanning through the shell is possible and this can be directed over the area of interest. In adult chelonians, the sites available for ultrasound are the prefemoral fossa and the region between the neck and the thoracic inlet.

## KEY LEARNING OBJECTIVES

- Understand the importance of the correct positioning when performing a radiological study in a chelonian
- Discuss the limitations of conventional radiology compared to computed tomography
- Discuss the different diagnostic imaging techniques when dealing with respiratory signs in a reptile

## MULTIPLE CHOICE QUESTIONS

1. Why is radiography used as a diagnostic technique in reptiles with metabolic disorders?
  - (A) Because it has high sensitivity in the first stage of the disease
  - (B) To provide useful evidence regarding the prognosis of the patient
  - (C) It cannot be used in chelonians
  - (D) None of the answers is correct
2. Where can ultrasonography be performed in all chelonians?
  - (A) Through the prefemoral fossa and the region between the neck and thoracic inlet
  - (B) Through the prefemoral fossa, the carapace and the region between the neck and thoracic inlet
  - (C) Through the prefemoral fossa, the plastron and the region between the neck and thoracic inlet
  - (D) In water, to hydrate the skin and minimize artefacts
3. What is the LL view is especially useful for diagnosing in lizards?
  - (A) Nutritional secondary hyperparathyroidism
  - (B) Renal disease
  - (C) Follicular stasis
  - (D) All of the above



Thursday 4 April  
Hall 8

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# Dermatophytosis

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- 54 08:30–09:15  
**Dermatophytosis case book – common impersonators and atypical presentations**  
Sue Paterson
- 55 09:25–10:10  
**Is it a false positive? Current recommendations for diagnosis of dermatophytosis**  
Sue Paterson
- 56 11:05–11:50  
**Managing multiples: dermatophytosis disease outbreaks**  
Sue Paterson



## Dermatophytosis case book – common impersonators and atypical presentations

Sue Paterson

Dermatophytosis is an uncommon dermatological disease, representing less than 2% of dermatological disorders in dogs and cats. The most common dermatophyte species found in domesticated animals belong to the genera *Microsporum* or *Trichophyton*.

The clinical signs of dermatophytosis are protean and as such can mimic many different diseases. The classical text book description of *Microsporum canis* infection in dogs and cats is of a well circumscribed, focal or multifocal, mildly pruritic, alopecic 'cigarette' scale lesions; but dermatophytosis can present with any combination of hair loss, papules, scales, crusts, erythema, follicular plugging, hyperpigmentation and, particularly in dogs, with changes in nail growth/appearance.

*M. canis* is the most commonly identified feline dermatophyte and should be on the differential diagnoses list of any dermatological problem in the cat. This should include such diseases as the eosinophilic granuloma complex, including miliary dermatitis, eosinophilic plaques and granulomas. Any cat with an alopecic condition should be assessed for dermatophytosis whether the hair loss is traumatic due to over-grooming and associated self-inflicted trauma, or due to spontaneous hair loss due to follicular infection. Dermatophytosis can present with focal or generalized scaling which can mimic a range of seborrhoeic and inflammatory diseases, such as idiopathic seborrhoea, allergy and ectoparasite infestations (which are often seen in conjunction with dermatophyte infections). Immune-mediated diseases, such as mural folliculitis, and neoplastic diseases, such as epitheliotropic lymphoma or thymoma, may also have similar presentations to generalized dermatophytosis. Pododermatitis can be a presenting sign of dermatophytosis in the cat.

In the dog the most commonly identified dermatophytes are *M. canis*, *M. persicolor* and *Trichophyton mentagrophytes*. Whilst dogs with *M. canis* often present with the classical focal, alopecic grey, scaling lesions, this pathogen can also manifest with other signs. *Microsporum persicolor* can present with generalized dorsal scaling, so that it should be investigated and ruled out in any inflammatory (allergy, ectoparasites); endocrine (hypothyroidism, hyperadrenocorticism); neoplastic (epitheliotropic lymphoma) or seborrhoeic disease with similar dermatological signs. Animals with immunosuppressive disease are more susceptible to the development of ringworm.

They often present with atypical multifocal or diffuse lesions, so the addition of a dermatophyte culture is useful in any disease that leads to immune suppression. Infections with *Trichophyton* spp. are more inflammatory than infections with *Microsporum* spp. They can therefore mimic many different ulcerative, inflammatory diseases such as pyotraumatic dermatitis and pyoderma. Dermatophyte infection of nails, onychomycosis, is typically characterized by onychogryphosis of one or multiple digits. Principal differential diagnoses for onychomycosis include symmetrical lupoid onychodystrophy, dermatomyositis and leishmaniasis. Pustular dermatophytosis has been described in dogs and it can histologically mimic pemphigus foliaceus.

Both dogs and cats can develop nodular dermatophyte infections. These include kerion, pseudomycetoma and mycetoma. Kerions present as single or multiple erythematous, alopecic, dome-shaped, exudative nodules. Pseudomycetomas and mycetomas present as nodules that fistulate, ulcerate and drain serous to purulent debris with tissue grains. Nodular dermatophyte infections should be included in all differential diagnoses lists for hyperplastic and neoplastic diseases.

### KEY LEARNING OBJECTIVES

- Learn the most common presentations of dermatophytosis in dogs and cats
- Recognize the wide range of atypical presentations of dermatophytosis and the most common differential diagnoses
- Recognize the different nodular forms of dermatophytosis and the appropriate differential diagnoses that should be considered

### MULTIPLE CHOICE QUESTIONS

1. Which of these is not recognized as a cause of dermatophyte infection in the dog?  
(A) *Microsporum cati*  
(B) *Microsporum canis*  
(C) *Microsporum persicolor*  
(D) *Microsporum gypseum*
2. Which of the following would not be considered as a differential diagnosis for onychomycosis in the dog?  
(A) Leishmaniasis  
(B) Pemphigus foliaceus  
(C) Dermatomyositis  
(D) Symmetrical lupoid onychodystrophy
3. Which of the phrases below best describes the typical lesions of *Microsporum canis* infection?  
(A) Nodular and exudative  
(B) Grey scale and alopecia  
(C) Crusted and papular  
(D) Erythematous and ulcerated

# Is it a false positive? Current recommendations for diagnosis of dermatophytosis

Sue Paterson

## DIAGNOSIS

Dermatophytosis is an infectious and contagious disease, so where it is suspected as a cause of clinical lesions in a cat or dog every effort should be made to make a diagnosis and start appropriate therapy as quickly as possible. There is no one 'gold standard' test, so multiple techniques should be employed. A range of different tests can be employed to diagnose dermatophytosis.

**Woods lamp examination** will identify the typical apple green fluorescence of *Microsporum canis*-infected hair shafts. Other dermatophytes do not fluoresce. Topical therapy with lime sulphur or enilconazole will not cause loss of fluorescence. False-positive fluorescence can be seen with topical medication but it does not involve the whole hair shaft and is not usually apple green.

**Dermoscopy** is a non-invasive diagnostic technique using a tool that allows illuminated magnification of the skin. Findings that have been described that are unique to cats with dermatophytosis include opaque, slightly curved or broken hairs with a homogeneous thickness ('comma hairs') and hairs with a corkscrew or coiled appearance.

**Direct examination of hair and/or scale** taken from lesional skin can be useful. The sample is mounted in solutions of chlorphenolac, mineral oil, potassium hydroxide and calcofluor. Stains such as lactophenol cotton blue and Indian ink can be added to the mounting medium to improve visualization of fungal elements.

**Fungal culture** can be taken by hair coat brushing (toothbrush or sterile carpet square), hair pluckings or by sticky tape sampling. Sabouraud's dextrose agar (SDA) or dermatophyte test medium (DTM) are suitable growth media. SDA encourages the development of typical fungal growth characteristics, e.g. reverse pigmentation and macroconidia to allow identification; DTM relies on a colour change from yellow to red in the medium, within 10 days, due to a pH change triggered by early dermatophyte growth.

**Polymerase chain reaction (PCR)** can be used as a diagnostic tool. However, a positive PCR indicates the presence of dermatophyte but not that there is active infection. It is probably best employed in combination with other tests.

**Biopsy** is not a useful diagnostic tool for dermatophytosis. Histopathology with special stains may be useful for nodular lesions.

## TREATMENT

Dermatophytosis can be treated with both systemic and topical medication. The current World Association for Veterinary Dermatology (WAVD) recommendations for topical therapy are lime sulphur, enilconazole or a miconazole/chlorhexidine shampoo. Used twice weekly, these topical therapies can resolve localized dermatophytosis, protect against infection and reduce environmental contamination. In generalized disease they may be combined with systemic medication to reduce the time to mycological cure.

Itraconazole and terbinafine are the safest and most effective systemic therapies in dogs and cats. Ketoconazole and fluconazole are less effective and have been shown, particularly in cats, to produce gastrointestinal side effects.

Lufenuron has been shown to have no *in vitro* activity against dermatophytes; it does not alter the course of infection or enhance the activity of other topical or systemic drugs and has no place in therapy.

Anti-fungal vaccines offer no protection against dermatophyte challenge but do seem to produce some benefit when used in combination with other therapy.

## KEY LEARNING OBJECTIVES

- Appreciate the different diagnostic tests that can be used to diagnose dermatophytosis
- Appreciate the different topical products that can be used in therapy
- Learn about the different systemic antimycotics that may be used to treat dermatophytosis

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is NOT considered to be a useful test to diagnose dermatophytosis?
  - (A) Wood's lamp examination
  - (B) Examination of hair with calcofluor staining
  - (C) Dermoscopy of hair
  - (D) Serum M. canis IgG levels
2. Which statement about these systemic therapies is true?
  - (A) Anti-fungal vaccines are useful in controlling dermatophytosis
  - (B) Itraconazole is tolerated better in cats than ketoconazole
  - (C) Terbinafine is not a useful drug for dermatophytosis therapy
  - (D) Lufenuron has excellent activity against dermatophytes
3. Which of these topical products is recommended (WAVD guidelines) for topical therapy of dermatophytosis?
  - (A) Lime sulphur
  - (B) Chlorhexidine
  - (C) Benzoyl peroxide
  - (D) Ethyl lactate

## Managing multiples: dermatophytosis disease outbreaks

Sue Paterson

The management of multiple outbreaks can be challenging, especially where it involves a rescue centre where financial constraints can make therapy difficult.

The first stage should be to diagnose which animals are infected and which are not infected. Diagnosis is most economically achieved by clinical examination and Wood's lamp inspection with microscopic assessment. Fungal culture may be necessary in some cases but should not be used where other diagnostic methods are adequate.

Animals should be divided into infected and non-infected, and should be strictly isolated from each other. The non-infected group should be treated twice weekly with lime sulphur to prevent infection and treat any infected animals that have been missed by the initial diagnostic tests. This is safe for use on kittens, adult queens and breeding males.

Infected animals should, where finances allow, be treated with a combination of topical and systemic medication. Suitable protocols include oral itraconazole and twice-weekly limesulphur dips; oral terbinafine and twice weekly limesulphur dips; or itraconazole with twice weekly application of enilconazole. Studies have shown that combinations of topical and systemic medication can clear a shelter of dermatophytosis within a month.

Animals should be monitored and once there is evidence of clinical cure, fungal cultures should be performed. Current recommendations suggest mycological cure is consistent with two negative cultures 7 days apart. Once mycological cure is achieved, animals can be transferred to the non-infected group.

Infection of animals and people from the environment without concurrent microtrauma is very rare. The main aim of environmental decontamination is to prevent fomite contamination which can lead to false-positive fungal results as part of the treatment monitoring process, leading to the unnecessary prolongation of therapy and extended periods of confinement. The clipping of an animal's coat, together with topical therapy, can help to reduce environmental contamination. A range of different strategies can be employed to remove infected material from the environment. For non-porous surfaces this should involve three steps. The first is the mechanical removal of all debris by vacuuming or sweeping. The second step should be washing of the surface with a household detergent to clean the surfaces, followed by the application of an anti-fungal disinfectant. The use of

a disinfectant without appropriate cleaning is often ineffective. Suitable disinfectants include: sodium hypochlorite (household bleach), which has been shown to be effective at concentrations ranging from 1:10 to 1:100; enilconazole; accelerated hydrogen peroxide and potassium peroxymonosulphate. The decontamination of soft fabric is not dependent on disinfectants but can be accomplished by mechanical washing in any water temperature with or without sodium hypochlorite. Two washes on the longest wash cycles appear to be effective; it is important not to over-fill the drum, so that adequate agitation can take place. Decontamination of carpets cannot be achieved by vacuuming alone. Pretreatment of the carpet with a disinfectant followed by a carpet shampoo was found to be effective. A small piece of carpet should be checked for colourfastness before any disinfectant is applied to large areas.

### KEY LEARNING OBJECTIVES

- Learn how to put in place a successful treatment plan for a cattery
- Learn which combinations of drugs produce the most rapid resolution of clinical signs
- Learn what measures need to be undertaken to achieve environmental decontamination

### MULTIPLE CHOICE QUESTIONS

1. Which combination of topical and systemic therapy is NOT recommended as part of a cattery treatment protocol?  
(A) Lime sulphur twice weekly with oral terbinafine  
(B) Enilconazole twice weekly with oral itraconazole  
(C) Lime sulphur twice weekly with oral itraconazole  
(D) Potassium iodine twice weekly with oral terbinafine
2. How is mycological cure defined, according to World Association for Veterinary Dermatology (WAVD) guidelines?  
(A) Two negative fungal cultures 7 days apart  
(B) Absence of lesional skin for a period of 7 days  
(C) Two negative cultures 14 days apart  
(D) Lack of Wood's lamp fluorescence
3. Which phrase best describes the three necessary steps in environmental decontamination for dermatophytosis?  
(A) Disinfection, desiccation, drying  
(B) Cleaning, detergent, disinfection  
(C) Disinfection, detergent, drying  
(D) Cleaning, disinfectant, detergent

## Section III

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# Veterinary streams

Friday 5 April

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Friday 5 April  
Hall 1

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# Ophthalmology

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- 60 08:30–10:10  
**The cracked or dirty windshield: disorders of the ocular surface**  
Caryn Plummer
- 61 11:05–11:50  
**The ‘bulging eye’: how do I know; how do I treat?**  
Ron Ofri
- 62 12:00–12:45  
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Ron Ofri



## The cracked or dirty windshield: disorders of the ocular surface

**Caryn Plummer**

The conjunctiva is associated with many adnexal and bulbar diseases due to its exposure and close proximity to both internal and external ocular structures. The key to the clinical management of conjunctival diseases is to determine and, if possible, eliminate the cause. The conjunctiva plays a role in tear dynamics, immunological protection of the eye, ocular movement and corneal healing. A mucous membrane, the conjunctiva, lines the inside of the eyelids (palpebral conjunctiva), beginning at the eyelid margin and extending deep toward the orbit to create a fornix (conjunctival cul-de-sac or fornix), at which it reverses direction and extends over the globe to the limbus (bulbar conjunctiva). The bulbar conjunctiva is freely movable, except near the limbus, thereby facilitating its use as a graft tissue for the cornea. The conjunctiva contains many lymphoid nodules, which receive antigen and to present it to circulating mononuclear cells. Goblet cells are also present in the epithelial layer of the conjunctiva. These cells produce a gel-like mucin, which forms the deepest of the three layers of the precorneal (i.e. precorneal) tear film. Deficiencies in the precorneal tear film may be either quantitative or qualitative. Disturbances of the tarsal or Meibomian glands (lipid layer of the tear film) and the conjunctival goblet cells (mucin layer of the tear film) may produce clinical signs of keratoconjunctivitis sicca (KCS) but Schirmer's tear test measurements are usually within the normal range.

The cornea, as a unique portion of the outer fibrous tunic of the eye, is transparent and serves a major refractive function while maintaining a tough, physical and impermeable barrier between the eye and the environment. The cornea consists of an outer epithelium and basement membrane, stroma, Descemet's membrane, and the endothelium. Corneal transparency depends on the absence of blood vessels and pigment, its non-keratinized anterior surface epithelium, the stroma's lattice organization and the small diameter of the stromal collagen fibrils. The corneal endothelium

uses an active physiological pump to remove and transport fluid into the anterior chamber. Ulcerations of the cornea are among the most common ocular diseases in small animal patients, however, a variety of inflammatory and degenerative conditions may be problematic as well.

Maintaining the health of the tear film and the structures that comprise the ocular surface are critical to the integrity and clarity of the windshield.

### KEY LEARNING OBJECTIVES

- Recognize the clinical signs of tear film abnormalities and develop a plan for investigating and eliminating the underlying aetiology, instituting therapy and monitoring response
- Appreciate and differentiate between different types of opacities in the cornea and their underlying aetiologies
- Understand the pathogenesis and aetiology of corneal ulceration and recognize clinical signs that indicate a corneal wound is likely to progress

### MULTIPLE CHOICE QUESTIONS

1. Which of the following can be used to specifically reduce the excessive enzymatic activity which results in corneal collagen destruction?  
(A) Diclofenac  
(B) EDTA  
(C) Ciprofloxacin  
(D) Atropine
2. Which of the following can result in clinical signs of dry eye?  
(A) Feline herpesvirus-1  
(B) Meibomianitis  
(C) Facial nerve paralysis  
(D) All of the above
3. Which of the following is NOT an indication that a corneal ulcer may be infected?  
(A) Cellular infiltrate  
(B) Profound uveitis  
(C) Keratomalacia  
(D) Re-epithelialization

# The 'bulging eye': how do I know; how do I treat?

Ron Ofri

## TRAUMATIC PROLAPSE

### Prognostic indicators

- Skull conformation. Traumatic prolapse is common in brachycephalic dog breeds, due to the shallow orbit and poor lid closure. In these breeds minimal trauma may cause prolapse. In cats and in mesocephalic and dolichocephalic dogs the prognosis is poorer
- Depending on the duration of the prolapse, animals may present with corneal ulceration, necrosis or perforation
- Hyphaema is a bad prognostic indicator, implying trauma to the uvea or globe rupture. Ultrasound examination may reveal other intraocular injuries.
- Pupillary light reaction (PLR) is an important sign. If the pupil cannot be seen, the consensual reflex should be checked
- Strabismus and extraocular muscles. Rupture of too many muscles will result in ocular ischaemia

### Treatment

Anaesthetize the patient and pull the eyelids out over the equator. The globe is pushed back into the orbit using gentle pressure. A lateral canthotomy may facilitate replacement. Temporary tarsorrhaphy is performed to maintain lid closure. Make sure that the suture passes through the lid margin (Meibomian gland openings) and not through the palpebral conjunctiva.

## EXOPHTHALMOS

### Retrobulbar cellulitis/abscess

The disease is characterized by acute onset and by severe pain. This leads to refusal to eat and great resistance to opening the mouth for examination. Sedate the patient, open the mouth and then you may see a red swelling, or even an open draining tract, in the oral mucosa, behind the last upper molar tooth. If no gross lesion is visible, use imaging techniques, such as ultrasound or computed tomography (CT) that may also demonstrate foreign bodies, or allow performance of guided fine-needle aspirations for cytological diagnosis.

To treat, incise the mucosa behind the last upper molar, and slowly inset a pair of curved hemostats to blindly explore the orbit and open pockets of exudate. If a pocket of exudate is encountered, copious amounts of exudate will flow out. In cases of retrobulbar cellulitis, no massive drainage of exudate will be seen. However,

the very act of establishing a draining tract is usually sufficient to achieve a cure.

Flush the orbit with saline and antibiotics. The wound is not sutured. Systemic antibiotics are administered for 10–14 days, and the animal fed soft food. Dramatic, and most rewarding, improvement is usually observed within 1–2 days.

### Retrobulbar tumour

In contrast to retrobulbar abscesses, retrobulbar tumours are usually very slowly progressive, and non-painful. Furthermore, patients with retrobulbar tumours are significantly older than patients with retrobulbar abscesses. A retrobulbar tumour can cause deformation of the posterior part of the globe that can be visualized ophthalmoscopically, or using ultrasonography. However, ultimate localization relies on ultrasonography, CT or magnetic resonance imaging (MRI). The diagnosis is confirmed by guided fine-needle aspiration and cytology.

Solitary tumours in early stages may be removed by orbitotomy, and it may be possible to preserve the globe and vision. Advanced cases may require radical orbitectomy, combined with radiation therapy and/or chemotherapy. However, most tumours are discovered in advanced stages, and due to their malignant nature they carry a very poor prognosis.

## KEY LEARNING OBJECTIVES

- What are the prognostic indicators in traumatic prolapse?
- How do I differentiate between exophthalmos and buphthalmos?
- How do I properly treat cases of traumatic prolapse and retrobulbar abscess?

## MULTIPLE CHOICE QUESTIONS

1. In cases of traumatic prolapse, when should enucleation be offered?
  - (A) There is hyphaema
  - (B) There is no PLR
  - (C) There is retinal detachment
  - (D) Surgical replacement has failed
2. With which of the following do patients with a retrobulbar tumour present?
  - (A) Acute pain
  - (B) Refusal to open the mouth
  - (C) Elevated third eyelid
  - (D) Blindness
3. How are exophthalmos and buphthalmos are differentiated?
  - (A) Retropulsion test
  - (B) Estimating corneal curvature
  - (C) Ultrasonography
  - (D) All of the above

## Glaucoma: understanding and treating a leading and painful cause of blindness

Ron Ofri

### DIAGNOSING GLAUCOMA

#### Measuring intraocular pressure

In most animals, the normal intraocular pressure (IOP) range is 15–25 mmHg. IOP should be similar in both eyes. Differences >10 mmHg between eyes may also indicate glaucoma.

#### Examining the iridocorneal angle – gonioscopy

The angle is examined to determine the risk of glaucoma (in case of a breed with primary glaucoma, or if the other eye developed the disease). Gonioscopy is performed in referral practices using a goniolens that allows us to visualize the entire angle, and to classify its state.

#### Based on clinical signs

Chronic or acute pain, buphthalmos, episcleral congestion ('red eye'), corneal oedema and striate keratopathy are commonly seen. The pupil may be sluggish, or fixed and dilated. Damage to the retina will cause progressive loss of vision, leading to complete blindness. In the end stage of the disease, due to chronic elevation of IOP, the ciliary body may atrophy, causing decreased aqueous production, lowering of pressure, and *phthisis bulbi*.

### TREATMENT

#### Principles of glaucoma treatment

- The aims of treatment are preventing further loss of vision and decreasing the pain. Currently, it is impossible to restore vision lost due to glaucoma
- Primary glaucoma requires lifelong treatment. Owners must understand that the aim of the therapy is to stabilize the IOP, and that the disease is never cured
- Diagnosis or suspicion of primary glaucoma in one eye mandates prophylactic treatment in the other eye

#### Medical therapy of glaucoma

- Osmotic diuretics. These drugs serve for emergency lowering of pressure in cases of acute attacks. The most commonly used drug in this category is

mannitol (1–2 g/kg i.v.), administered slowly, over 30 minutes, and water is withheld for 3–4 hours

- Prostaglandin analogues. These increase the unconventional outflow. They are most effective in the dog, because their effect is independent of the state of the angle. They are ineffective in cats (which lack the receptor), and are contraindicated in uveitis
- Carbonic anhydrase inhibitors. Carbonic anhydrase is a key enzyme in aqueous humour production, and its inhibition will result in lower production and decreased IOP. The topical form of the drug (dorzolamide, brinzolamide) has none of the systemic side effects observed with systemic drugs
- Topical miotics. These drugs increase drainage by opening the iridocorneal angle. The most commonly-used drug in this category is pilocarpine (1–4%, q8–12h)
- Beta-blockers. These sympatholytic drugs reduce aqueous production by reducing flow of blood to the ciliary body. They are commonly used in humans, but their effectiveness in animals is controversial. Systemic side effects are common in small dogs, cats and animals with pulmonary/ cardiovascular diseases

#### Surgical treatment of glaucoma

Referral ophthalmology clinics may perform surgery to increase aqueous outflow (usually by implanting drainage tubes in the eye), or to decrease aqueous production (through partial destruction of the ciliary body, using laser or cryosurgery). However, treatment frequently fails, resulting in a blind and painful eye. Patient welfare requires the removal of this eye, through enucleation or evisceration (implanting a prosthesis in an empty scleral 'shell', to provide a more cosmetic appearance).

### KEY LEARNING OBJECTIVES

- How do we classify glaucoma and why is it important?
- What are the clinical signs of glaucoma?
- How should I treat my glaucoma patients?

### MULTIPLE CHOICE QUESTIONS

1. What is the drug of choice for treating primary canine glaucoma?  
(A) Latanoprost  
(B) Dorzolamide  
(C) Pilocarpine  
(D) Timolol
2. What is the drug of choice for treating feline glaucoma?  
(A) Latanoprost  
(B) Dorzolamide  
(C) Pilocarpine  
(D) Timolol

3. Which of the following is TRUE about beginning preventive treatment in the unaffected eye in a dog presenting with unilateral, primary glaucoma?
- (A) Is a waste of time and money, as the dog will get glaucoma in the unaffected eye within a week

- (B) Guarantees the dog will never have glaucoma in the unaffected eye
- (C) Will delay glaucoma in the unaffected eye by about 4–6 months
- (D) Will delay glaucoma in the unaffected eye by about 2 years

## Ophthalmic manifestations of endocrinopathies

Caryn Plummer

Small animal patients afflicted with various endocrinopathies are at risk for the development of many ophthalmic conditions as the result of their endocrine hormone imbalances. The most well recognized ophthalmic consequence of an endocrine disorder is the development of cataracts secondary to canine diabetes mellitus (DM). However, cataracts are not the only potential ocular complication of this pancreatic endocrine disease. Secondary lens-induced uveitis, poor corneal wound healing and corneal neuropathy, altered lipid metabolism, retinal lesions and systemic hypertension are also potential consequences of diabetes in small animals. The incidence and severity of ophthalmic manifestations of DM are generally related to the efficacy of glycaemic control.

Ocular complications are often not considered among the primary manifestations of hyperadrenocorticism (HAC) in small animals. However, there is actually an extensive list of possible ophthalmic consequences to the excessive levels of corticosteroids present in this disorder. Possible findings vary depending on the specific circumstances of the case and the location of the primary causative lesion, in the adrenal glands themselves or in the pituitary gland. Conversely, systemic hypertension and its repercussions are common regardless of the site of the primary lesion, as are metabolic changes associated with hyperlipidaemia and lipoproteinaemia. In addition to its previously discussed lipid-laden aqueous and retinalis, hyperlipidaemia in the Cushingoid patient occasionally results in cholesterol infiltrates in the cornea. Acute blindness from sudden acquired retinal degeneration has been associated with disease of the pituitary–adrenal axis. Concurrent DM seen in some cases contributes the additional risks of cataract development and lens-induced uveitis, as well as the potential for retinal pathology.

Ocular signs associated with hypothyroidism are not common, but can occur. When they are observed, they are usually secondary to hyperlipidaemia or hyperlipoproteinaemia. However, there are other potential ocular consequences of hypothyroidism, including those due to

neurological dysfunction. Facial nerve paralysis can initiate or exacerbate difficulties with exposure and subsequent keratitis. Horner's syndrome, in which patients present with miosis, ptosis, enophthalmos and protrusion of the third eyelid, may also be present in some cases. Occasionally, keratoconjunctivitis sicca (KCS) can result from a peripheral neuropathy affecting the innervation of the lacrimal gland and may even accompany facial paralysis. Corneal lipid deposits and infiltrates or lipid-laden aqueous humour and its associated uveitis are the most common metabolic consequences of hypothyroidism. The most predictable ophthalmic manifestations of hyperthyroidism are those associated with systemic hypertension.

Disorders of calcium homeostasis are unusual, but can occur, usually in the form of cataracts in hypocalcaemic patients or metastatic calcification of the ocular tissues.

### KEY LEARNING OBJECTIVES

- Recognize and appreciate the many and varied ophthalmic consequences of endocrine disease and their clinical signs
- Understand the aetiopathogenesis of ophthalmic lesions that develop with endocrine disease
- Recognize when therapy is indicated for endocrine-induced ophthalmic disease

### MULTIPLE CHOICE QUESTIONS

1. Diabetes mellitus may be associated with which ocular abnormalities?
  - (A) Cataracts
  - (B) Recurrent or refractory corneal ulcers
  - (C) Retinal haemorrhage
  - (D) All of the above
2. Hyperlipoproteinaemia may result in which ocular abnormalities?
  - (A) Lipaemic aqueous humour
  - (B) Corneal ulceration
  - (C) Enophthalmos
  - (D) Facial paralysis
3. Ocular signs consistent with systemic hypertension may occur with which disease states?
  - (A) Hyperadrenocorticism
  - (B) Diabetes mellitus
  - (C) Renal failure
  - (D) All of the above

## Masquerading eye disease: when one disease looks like another

Caryn Plummer

There are two potential scenarios for a masquerading ocular disease. The first is that the eye disease is actually a manifestation of a systemic condition. The other involves an uncommon or lesser recognized eye condition that grossly resembles a common condition. This lecture will touch on both situations.

The eye is the window to the soul, as the saying goes ... But it is also sometimes the window to the body. Due to the presence of various blood–ocular barriers, the impact of systemic disease on the eye is blunted. When systemic disease does affect the eye, the consequences can be dire. The eye has only a limited capacity to respond to insult (inflammation and degeneration) and if its own reactions to disease are not addressed promptly, the structures that permit vision can be irrevocably damaged and significant pain can result. Any global disease process has the potential to affect the eye. Haematological, biochemical, developmental, degenerative, metabolic, inflammatory, infectious, immune-mediated, neoplastic, nutritional, toxic, traumatic and vascular diseases have all been reported to cause harm to the eye (remember the DAMNIT-V scheme?). In many instances, ocular involvement changes the required treatment or prognosis of systemic disease. The importance of including a full ophthalmic examination with your physical examination cannot be stressed enough. Also, when a patient presents with ocular disease (especially if it is bilateral and inflammatory), a full physical examination should be performed to look for underlying systemic aetiologies.

Lymphoma in dogs and cats is the ultimate masquerader. It may manifest as corneal oedema, centrally migrating white bands of neoplastic cells, stromal haemorrhage, corneal vascularization, anterior uveitis with hyphaema, hypopyon, keratic precipitates and secondary glaucoma, and tortuous retinal vessels, retinal haemorrhages, perivascular sheathing, retinal detachment, or retinal tissue infiltration by tumour cells. Conjunctivitis,

hyphaema, anterior uveitis, retinal detachment and glaucoma may be caused by lymphoma. Lymphadenopathy combined with bilateral anterior uveitis or intraocular haemorrhages should cause suspicion of lymphoma.

There is a variety of primary ocular conditions that are not what they seem. Benign cysts and solid tissue masses can be difficult to differentiate. Manifestations of pigment dispersion and proliferation may be especially difficult to tease apart. Neoplasms can appear similar to inflammatory conditions and corneal opacities may appear similar but be the result of significantly different disease processes.

### KEY LEARNING OBJECTIVES

- Recognize when an ophthalmic condition may be an ophthalmic manifestation of a systemic condition and when further diagnostics are indicated
- Appreciate subtle differences in clinical manifestation, coexisting clinical signs and signalment to help differentiate between ocular conditions with similar appearances
- Appreciate the many ocular manifestations of lymphoma in small animals

### MULTIPLE CHOICE QUESTIONS

1. Uveal cysts may be associated with uveitis and glaucoma in what canine breed?  
(A) Poodles  
(B) Golden Retrievers  
(C) Irish Wolfhounds  
(D) Basenjis
2. Lymphoma may present with which of the following clinical signs?  
(A) Uveitis  
(B) Retinal detachment  
(C) Exophthalmos  
(D) All of the above
3. What might a diagnostic work-up for bilateral uveitis include?  
(A) Complete blood count and serum biochemical profile  
(B) Geographically (including travel history) appropriate infectious disease serology  
(C) Imaging of the thorax and abdomen  
(D) All of the above

## Cataract: what can I do about it?

Ron Ofri

Cataract is an opacity of the lens. Potential causes include metabolic disease (e.g. diabetes mellitus), intraocular disease (e.g. uveitis) and aging. However, the

most common cause of canine cataracts appears to be genetic predisposition. Cataracts have been demonstrated to be hereditary in a score of breeds, and are suspected of being hereditary in dozens of other breeds. Therefore, mating of animals with cataracts suspected of being inherited should be strongly discouraged.

Cataracts are commonly classified by their maturation. *Incipient* cataracts are a focal opacity. This usually progresses to involve most of the lens. At this stage, the *immature* cataract obscures funduscopic details, and vision deteriorates. As the cataract becomes completely opaque

(mature), tapetal reflection and vision are lost. In *hypermaturation* cataracts the lens proteins break down and leak through the capsule. Because lens protein is immunogenic, the leakage will cause lens-induced uveitis (LIU).

Currently, there is no efficacious medical treatment for slowing, halting or reversing the progression of cataracts. Cataracts remain a surgical problem.

There are several important considerations in choosing the surgical candidate. The first is the stage of cataract maturation. Patients with incipient cataracts do not require surgery, as the effect on vision is minimal. However, this may be an optimal time to refer the patient to a veterinary ophthalmologist who will assess the cataract and fundus. On the other hand, patients with hypermature cataracts make poor surgical candidates, as they usually suffer from severe LIU that gravely impacts surgical prognosis. Most ophthalmologists prefer to operate on immature cataracts, when there are significant visual deficits but minimal LIU.

Obviously, cataract surgery will not restore vision to patients whose retina is dysfunctional. Therefore, preoperative assessment of retinal function is of utmost importance. Retinal function (and visual prognosis) is usually determined by recording the electrophysiological response of the retina to light. The presence of pupillary light reflexes does not rule out retinal degeneration; these reflexes may be sluggish, but are usually present. An ultrasound examination does not test retinal function, either. It is used to diagnose retinal detachment and/or vitreal disease.

Other considerations include the overall health of the eye and the patient. This is an elective surgery that can be postponed so that LIU, or any other ocular and systemic diseases, may be treated prior to surgery. Also, consider the personality of the dog and/or owner. Many cataract patients require vigorous or long-term postoperative treatment. Aggression in the dog, or a physical handicap of the owner, that would prevent administering such treatment to the patient will negatively impact the surgical outcome.

Referring veterinarians should also be aware of the perioperative medical treatment administered to patients, though this treatment may vary between veterinary ophthalmologists. Typically, it consists of various

regimens of anti-inflammatory and mydriatic drugs. Antibiotics and prophylactic glaucoma therapy may also be administered.

There is a long list of potential intraoperative complications. However, technological advances enable most surgeons to claim a success rate of over 90%. Unfortunately, this rate may decline with time due to long-term complications, notably LIU and glaucoma.

## KEY LEARNING OBJECTIVES

- What are the stages of cataract, and when should I refer?
- What examinations will be conducted to determine surgical prognosis?
- What other factors affect surgical prognosis?

## MULTIPLE CHOICE QUESTIONS

1. At which stage do cataract surgeons prefer to operate?
  - (A) Incipient
  - (B) Immature
  - (C) Mature
  - (D) Hypermature
2. Preoperatively, how is retinal function determined?
  - (A) Patient signalment and history of night blindness
  - (B) Pupillary light reflexes
  - (C) Ultrasonography
  - (D) Electroretinography
3. Which is the best option for patients that cannot undergo cataract surgery?
  - (A) Should be euthanased
  - (B) The eye should be enucleated
  - (C) Should be treated with anti-inflammatory drugs and monitored for LIU
  - (D) Will learn to manage

# Will my dog see again? Examination, assessment and differential diagnosis of the blind patient

**Ron Ofri**

## HISTORY

As with any patient, begin by taking a history. Inquire whether the blindness is acute or of gradual onset.

Inquire whether it was associated with preferential loss of night vision, a classic sign of inherited, degenerative diseases of the outer retina (progressive retinal atrophy, PRA). Finally, inquire whether the animal is healthy, or are there other signs of illness, besides loss of vision. Blindness may be caused by numerous systemic or neurological diseases that present with additional signs of clinical disease.

## LOCALIZING THE LESION IN THE BLIND PATIENT

Based on the results of the ophthalmic examination, the patient may be categorized into one of four general categories:

- Abnormal ophthalmic findings combined with a normal/diminished pupillary light reflex (PLR). Patients in this category suffer either from opacity

of the ocular media (e.g. corneal oedema) or from retinal disease (e.g. PRA, chorioretinitis)

- Abnormal ophthalmic examination and lack of PLR. Common causes include glaucoma, retinal detachment and optic neuritis involving the proximal optic nerve
- Normal ophthalmic examination and lack of PLR. Common causes include sudden acquired retinal degeneration (SARD), optic neuritis involving the distal optic nerve, and neoplasia compressing the optic nerve or chiasm
- Normal ophthalmic examination and normal PLR. These are usually neurological cases

Diagnosis of diseases in the first category is usually based on the findings of the ophthalmic examination. Diseases in the fourth category are characterized by an unremarkable ophthalmic examination in a blind patient with normal PLRs. However, the diagnosis of patients presenting with acute blindness and fixed, dilated pupils (the second and third categories) may be challenging. The leading differential diagnoses for this presentation include glaucoma, retinal detachment, SARD and optic neuritis.

- Glaucoma patients usually present with numerous ophthalmic signs besides acute blindness and loss of PLR, and therefore they can be readily distinguished from the other three causes of this presentation
- Retinal detachment may be diagnosed by an ophthalmoscopic examination. When the fundus cannot be visualized (e.g. due to severe corneal oedema or hyphaema), the detachment can be demonstrated in an ultrasound examination of the eye
- Optic neuritis may be divided into proximal and distal inflammation of the optic nerve. In the former, an ophthalmoscopic sign may reveal signs, including hyperaemia, congestion and

haemorrhages of the disc and peripapillary area.

However, distal optic neuritis and SARD patients will both present with acute blindness, fixed, dilated pupils and a normal-looking fundus. In such cases, an electroretinography recording is recommended to differentiate between the two diseases

## KEY LEARNING OBJECTIVES

- Learn key questions that should be asked when taking the history of blind patients
- Learn to properly assess vision in patients
- Learn the differentials for blind patients presenting with or without pupillary light reflexes

## MULTIPLE CHOICE QUESTIONS

1. In which of the following diseases will PLR be present?  
(A) Chorioretinitis  
(B) Glaucoma  
(C) Retinal detachment  
(D) SARD
2. How can SARD and optic neuritis be differentiated?  
(A) Presence of PLR  
(B) Ophthalmoscopic examination  
(C) Electroretinography  
(D) Ultrasonography
3. What may a positive dazzle test replace the need for?  
(A) The menace test  
(B) PLR  
(C) Electroretinography  
(D) Ophthalmoscopy



Friday 5 April  
Hall 4

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# Haematology

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**Approach to anaemia**  
Vicki Black
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**Transfusion medicine**  
Dan Lewis
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**Management of IMHA**  
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**Approach to the suspected coagulopathic patient**  
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**Management of thrombocytopenia**  
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**Investigation of leucopenia**  
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- 73 17:45–18:30  
**Haemolytic anaemia: when is it not IMHA?**  
Vicki Black

## Approach to anaemia

**Vicki Black**

Anaemia is commonly encountered in the unwell canine or feline patient. Approach to anaemic animals, including interpretation of its significance and diagnostic work-up, including urgency of investigations and therapy, varies significantly depending upon patient presentation.

Anaemia may be suspected based upon history and clinical examination. Owners may have noticed subtle signs, for example mild lethargy or reduced exercise tolerance, in addition there may be a history of pica (in particular eating of cat litter or licking concrete), alternatively owners may have detected pallor (pale mucous membranes), or patients may present with signs more acutely concerning, for example collapse, tachypnoea (increased breathing rate), or tachycardia (increased heart rate).

Triage is a vital step in approach to the anaemic patient: necessity for treatment, especially blood transfusion, should primarily be guided by these clinical parameters rather than laboratory values. Cats are often more tolerant of marked anaemia. In fact, anaemic cats may present in a compensated state with haematocrits lower than 10% in some circumstances.

History and clinical examination of the anaemic animal should be thorough with attention directed towards evidence of haemorrhage, in particular interrogating the likelihood of gastrointestinal haemorrhage by carefully asking about stool colour, and a rectal examination to assess for melaena. Cats with significant anaemia will sometimes present with evidence of left volume heart overload and may have jugular pulsation and a gallop sound. Signalment and concurrent illness are also very important in these cases. A sighthound, such as a Greyhound, should normally have an increased haematocrit, therefore in fact a haematocrit in the lower end of the reference range may in fact be 'anaemic' for this patient. In a cat with long-standing chronic kidney disease, a mildly low haematocrit may not cause concern.

Anaemia can be diagnosed with a packed cell volume; however, haematology is a vital step in the diagnostic approach to these cases. Broadly speaking causes of anaemia can be categorized as regenerative or non-regenerative. Regenerative anaemias are those where there is evidence of increased red blood cell production by the bone marrow, an appropriate response to the presence of anaemia, whereas in non-regenerative anaemia the same bone marrow response is not

observed. The distinction can be made by presence of reticulocytes (immature red blood cells) and additional features of regeneration. After acute blood loss it can take up to 5 days to observe this regenerative response, therefore absence of regeneration on blood analysis does not exclude pre-regenerative anaemias.

Causes of regenerative anaemia can be broadly divided into those resulting from haemorrhage or haemolysis (rupture of red blood cells). History, clinical examination, clinical pathology results and, in some cases, imaging can help to discriminate between these. Non-regenerative anaemias can occur due a problem within the bone marrow itself or related to illness that reduces ability to produce red blood cells (erythropoiesis), such as iron deficiency, chronic kidney disease or inflammatory disease.

### KEY LEARNING OBJECTIVES

- Understand the importance of triage in the approach to the anaemic patient
- Appreciate important steps in the clinical examination of an anaemic dog or cat
- Apply a logical approach to causes of anaemia based upon history, clinical examination and investigation findings

### MULTIPLE CHOICE QUESTIONS

1. What cause of anaemia is most commonly associated with pica in cats?  
(A) Haemorrhage  
(B) Immune-mediated disease  
(C) Flea infestation  
(D) Paracetamol poisoning
2. Why should we be careful with intravenous fluid therapy in cats with anaemia?  
(A) They might have high sodium  
(B) They are often already in a state of volume overload  
(C) You might dilute the red blood cells  
(D) They might have kidney disease
3. What is the most helpful feature of haematology when looking for evidence of regeneration?  
(A) Platelet count  
(B) Mean cell volume (MCV)  
(C) Reticulocyte count  
(D) Nucleated red blood cells

## Transfusion medicine

**Dan Lewis**

The use of blood products in veterinary medicine is increasing rapidly, with wider familiarity with their appropriate use and greater availability. However, for many veterinary practices in the UK, blood product transfusion is still a relatively rare occurrence and the often urgent

nature of their requirement means that all veterinary surgeons treating small animals should have a basic knowledge of what blood products are available, when each is indicated, how to obtain a fresh whole-blood 'donation' and how to store and administer these products safely.

This lecture will outline the advantages and disadvantages of the different blood products currently available in the UK and where they can be sourced from. We will also discuss some of the key factors to remember in relation to blood types. Probably the most important aspect of this to remember is that cats have pre-existing

antibodies against other blood types and can suffer fatal transfusion reactions as a result of an incorrect choice; it is therefore vital to always blood type cats (donor and recipient) prior to transfusion and only administer them type-matched blood products.

We will explore how blood donations can be obtained, as well as how to select an appropriate donor. The range of blood products commercially available will then be discussed and the indications (and contraindications) for each product highlighted.

Finally, we will discuss how to calculate an effective dose and how to administer a transfusion safely to the benefit of our patients.

## KEY LEARNING OBJECTIVES

- To understand the basis of transfusion medicine and the therapeutic contributions that different blood products can make
- To recognize the importance of blood types and when to assess them
- To know where and how to obtain transfusion products and administer them safely

## MULTIPLE CHOICE QUESTIONS

1. Which is the most antigenic dog erythrocyte antigen (DEA)?
  - (A) 4
  - (B) 1
  - (C) Dal
  - (D) 7
2. Which is one of the best sources of factor VIII and von Willebrand's factor?
  - (A) Cryosupernatant
  - (B) Fresh whole blood
  - (C) Cryoprecipitate
  - (D) Frozen plasma
3. A 17-kg Springer Spaniel has a PCV of 12%. To about what level should 200 ml of packed red blood cells (PCV 60%) raise its PCV?
  - (A) 21%
  - (B) 28%
  - (C) 35%
  - (D) 42%

# Management of IMHA

**James Swann**

Immune-mediated haemolytic anaemia (IMHA) is considered to be the most common autoimmune disease of dogs, resulting in severe anaemia that produces considerable morbidity and mortality. Almost all dogs are treated with glucocorticoids, but there is considerable variation in the dose rate, tapering regimen and duration of therapy used to treat individual dogs. Additionally, many clinicians administer a combination of immunosuppressive drugs to limit adverse effects related to glucocorticoids; there is no evidence that this approach produces a more favourable outcome. In an effort to achieve consensus on some of these topics, the American College of Veterinary Internal Medicine recently commissioned a consensus statement on treatment of IMHA in dogs, due to be published by the end of 2018.

In agreement with this statement, there is no conclusive evidence to determine whether initial treatment with a glucocorticoid or with a glucocorticoid combined with another immunosuppressive drug (azathioprine, ciclosporin or mycophenolate mofetil) will result in a better outcome, so either approach seems to be clinically acceptable. However, use of combination therapy should be considered particularly if dogs are expected to develop severe adverse effects related to glucocorticoids, if they appear to be very severely affected, or if they fail to respond to prednisolone alone within the first week of treatment. If combination therapy is used, the starting dose of the glucocorticoid may be lower than if used alone and could be tapered more rapidly. Use of

cyclophosphamide is not recommended because this has been associated with a poorer outcome in dogs with IMHA in a previous study. A starting dose of prednisolone of 2–3 mg/kg per day is recommended, or 50 mg/m<sup>2</sup> for dogs weighing more than 25 kg. Higher doses will not produce a better or faster response but will increase the risk of severe adverse effects. Human intravenous immunoglobulin has been used for treatment of dogs with severe IMHA but there is no evidence that administration of this product improves outcome; routine use is therefore not recommended, even if it were easily available.

Dogs with IMHA frequently develop thromboembolic complications that may result in death. It is therefore recommended to administer an antithrombotic drug routinely to all dogs with IMHA. In the first 2 weeks of treatment, it may be advisable to administer injectable heparins but these drugs must be used with caution if monitoring tests are not available. Indeed, unfractionated heparin has unpredictable pharmacokinetics and should not be used without individual adjustment of doses. A more practical strategy involves administration of oral antiplatelet drugs, of which clopidogrel is preferred to aspirin, because as many as 30% of dogs do not respond to commonly used dose rates.

## KEY LEARNING OBJECTIVES

- Describe the major immunosuppressive drugs that may be used for treatment of immune-mediated haemolytic anaemia (IMHA) in dogs and their associated adverse effects
- Formulate a clinical approach to management of IMHA at initial diagnosis
- Consider the options available for antithrombotic treatment in dogs with IMHA

## MULTIPLE CHOICE QUESTIONS

1. Which immunosuppressive drug is no longer recommended for treatment of IMHA in dogs?  
(A) Ciclosporin  
(B) Mycophenolate mofetil  
(C) Cyclophosphamide  
(D) Azathioprine
2. What is the mechanism of action of azathioprine?

- (A) Inhibition of de novo purine synthesis  
(B) Inhibition of de novo pyrimidine synthesis  
(C) Inhibition of calcineurin  
(D) Inhibition of thiopurine methyltransferase
3. Which oral antiplatelet drug is preferred for its antithrombotic effect in dogs with IMHA?  
(A) Clopidogrel  
(B) Aspirin  
(C) Romiplostim  
(D) Tranexamic acid

## Approach to the suspected coagulopathic patient

**Vicki Black**

Bleeding disorders represent a source of concern for clients and veterinarians alike. Disorders of haemostasis can appear complicated, often due to the inaccessibility of the coagulation cascade and cell-based model of haemostasis. Whilst the underlying mechanisms behind the formation of a blood clot and the pathophysiology of hypocoagulability is a highly complicated process, the approach to these animals can be simplified.

Bleeding disorders can be divided into those affecting primary haemostasis, secondary haemostasis and fibrinolysis. Some cases will not neatly fit in to one of these categories and should always be considerations, including consumptive coagulopathy (disseminated intravascular coagulation), or *Angiostrongylus* infection.

Disorders of primary haemostasis encompass those responsible for formation of the primary platelet plug. Patients with a primary haemostatic disorder will typically present with bleeding affecting skin or mucosal surfaces, for example petechiae, ecchymoses, epistaxis, haematemesis or melaena, or haematuria. Although this is characterized by small surface bleeds, the blood loss, in particular within the gastrointestinal tract, can be haemodynamically significant and potentially fatal. Failure to form an effective primary platelet plug can be divided into a disorder in platelet count (thrombocytopenia) or platelet function (thrombocytopathia), which can be a direct platelet disorder or related to inability for platelets to bind, for example related to uraemia or hyperglobulinaemia, or von Willebrand's factor deficiency. The most common cause for disorders of primary haemostasis in the United Kingdom is primary immune-mediated thrombocytopenia, a diagnosis which can be reached based upon appropriate platelet count and exclusion of underlying triggers.

Disorders of secondary haemostasis encompass those involved in the stabilization of the primary platelet plug, this is especially important in larger blood vessels where the platelet plug is insufficient alone to stop the

haemorrhage. Patients typically present with intracavity bleeds, for example haemothorax or haemoabdomen, haemarthrosis, or haematomas. Broadly speaking these are disorders related to coagulation factors, the majority of which (aside from factor VIII) are exclusively manufactured by the liver. Disorders include deficiencies and ineffective factors, the most important considerations are vitamin K deficiency-related coagulopathy, hepatic dysfunction and congenital factor defects.

Disorders of fibrinolysis have become more recently acknowledged in the context of systemically unwell dogs, especially Greyhounds. They occur due to excessive breakdown of the fibrin following formation of the clot, therefore present as delayed bleeding. Diagnosis with current testing methods is challenging, and empirical treatment is sometimes adopted.

## KEY LEARNING OBJECTIVES

- Understand the different presentations for primary and secondary haemostatic disorders
- Appreciate the investigations and therapy guided at disorders of primary haemostasis
- Appreciate the investigations and therapy guided at disorders of secondary haemostasis

## MULTIPLE CHOICE QUESTIONS

1. What is the most likely explanation for a dog presenting with petechiae, ecchymoses and melaena?  
(A) Rodenticide toxicity  
(B) Von Willebrand's factor deficiency  
(C) *Angiostrongylus* infestation  
(D) Immune-mediated thrombocytopenia
2. In a dog with rodenticide toxicity with evidence of active severe haemorrhage what treatment would you consider in the short term?  
(A) Fresh frozen plasma  
(B) Vitamin K  
(C) DDAVP  
(D) Platelet-rich plasma
3. What is the current treatment used in dogs with a suspicion of hyperfibrinolysis?  
(A) Plasma  
(B) DDAVP  
(C) Tranexamic acid  
(D) Platelet-rich plasma

# Management of thrombocytopenia

James Swann

Thrombocytopenia refers to a reduction in the number of circulating platelets, which may be related to decreased production in the bone marrow, increased peripheral destruction or sequestration outside the circulation. There are numerous causes for thrombocytopenia, and a fresh blood smear should always be evaluated in dogs and cats with apparent thrombocytopenia to ensure this is not due to artefactual clumping after sample collection. The most common cause of severe thrombocytopenia is immune thrombocytopenia (ITP), an autoimmune disease associated with production of antibodies specific for platelets, resulting in peripheral destruction. When the platelet count decreases below  $30\text{--}40 \times 10^9/\text{l}$ , there is a risk of spontaneous mucosal haemorrhage, which is normally identified as petechial or ecchymotic haemorrhages on the skin and mucous membranes, or as melaena if haemorrhage occurs in the gastrointestinal tract.

There are few options available for immediate management of severe thrombocytopenia: platelets persist for only a few hours after transfusion of fresh whole blood, rendering this exercise futile in trying to control spontaneous haemorrhage. In people, tranexamic acid sometimes is administered to stabilize formation of fibrin clots, and this drug is being evaluated in a clinical trial of dogs with ITP. However, the drug is contraindicated in people with haematuria due to the risk of urinary tract obstruction if large blood clots form. In the USA, lyophilized platelet concentrates are available, and some centres produce platelet-rich plasma, though neither option is currently available in the UK.

Immune thrombocytopenia typically is treated with glucocorticoids. Administration of a single dose of vincristine may increase the rate of release of platelets from the bone marrow and shorten hospitalization time. A second immunosuppressive drug (such as azathioprine or ciclosporin) is frequently used alongside prednisolone, but there is no evidence to suggest whether this improves outcome or to determine which drug would be most suitable. Intravenous immunoglobulins have been administered to dogs with ITP but they appear to offer no benefit

compared to use of vincristine, which is more widely available. In dogs with ITP and active haemorrhage, most blood is lost through the gastrointestinal tract, such that presence of melaena is associated with a poorer outcome. It is therefore commonplace to administer omeprazole to dogs with ITP, though it is unclear whether this drug reduces the risk or severity of haemorrhage in the face of coagulopathy. Recently, there has been considerable interest in the use of romiplostim, a synthetic agonist of the receptor for thrombopoietin (TPO), which stimulates production and release of platelets from the bone marrow, in ITP. Use of the drug has been reported in five dogs with ITP and it did not appear to cause any adverse effects, but it is unclear whether it offers any additional benefit compared to conventional treatment.

## KEY LEARNING OBJECTIVES

- Describe the major causes and signs of thrombocytopenia in dogs and cats
- Formulate a plan for clinical management of emergency thrombocytopenia
- Describe a treatment plan for management of immune thrombocytopenia

## MULTIPLE CHOICE QUESTIONS

1. What is the mechanism of action of romiplostim?
  - (A) Agonist at the thrombopoietin receptor
  - (B) Agonist at the erythropoietin receptor
  - (C) Agonist at the G-CSF receptor
  - (D) Agonist at the interleukin 3 receptor
2. Which clinical feature is associated with a poor outcome in dogs with ITP?
  - (A) Epistaxis
  - (B) Melaena
  - (C) Haematuria
  - (D) Haemoptysis
3. Which drug may be used to increase the rate of release of platelets from the bone marrow in dogs with ITP?
  - (A) Cyclophosphamide
  - (B) Ciclosporin
  - (C) Vincristine
  - (D) Azathioprine

# Investigation of polycythaemia

Erik Teske

Polycythaemia or erythrocytosis is an increase in numbers of peripheral red blood cells (RBC), haemoglobin and packed cell volume (PCV) or haematocrit. The polycythaemia can be relative or absolute. A relative polycythaemia occurs when there is no real increase in

red blood cell mass but, due to excessive fluid loss, a decreased plasma volume occurs resulting in haemoconcentration. Another cause for relative polycythaemia could be splenic contraction due to anxiety. In absolute polycythaemia there is a true increase in RBC mass.

The production of erythrocytes is normally regulated by erythropoietin. When there is an increased demand, the erythropoietin concentration will increase leading to an enhanced erythrocyte production in the bone marrow. Based on the production of erythropoietin, the absolute polycythaemia is subdivided into a primary erythrocytosis (polycythaemia vera), where there is an autonomous production of erythrocytes and no increase

# Haematology

in erythropoietin, and a secondary erythrocytosis as a result of an excessive erythropoietin production.

Polycythaemia vera is a rare chronic myeloproliferative disease. In contrast to humans, the increase in erythrocytes is usually not associated with a leucocytosis and thrombocytosis. Also hepatosplenomegaly is not a common feature. In secondary erythrocytosis, the increase in erythrocyte numbers is due to an increase of erythropoietin. This could be an appropriate response due to a chronic state of systemic hypoxia, resulting in increased erythropoietin production by the kidneys. This can be seen in severe cardiac and pulmonary conditions. However, it could also be the result of excess erythropoietin production without systemic hypoxia, called inappropriate secondary erythrocytosis. Possible mechanisms are ectopic erythropoietin production by a tumour, increased erythropoietin production by the kidney in response to hypoxia of the kidney caused by its compression by a tumour, and increased production of so-called hypoxia-inducible transcription factors which stimulate erythropoietin production.

The clinical signs of polycythaemia result from hyperviscosity of the blood and dilatation and decreased perfusion of small blood vessels, resulting in erythema, blindness, neurological disturbances, bleeding, polyuria and thrombosis.

## KEY LEARNING OBJECTIVES

- Understand the pathophysiology of polycythaemia
- Learn the differential diagnoses
- Learn about the management of this problem

## MULTIPLE CHOICE QUESTIONS

1. A 3-year-old mixed-breed male dog is presented with a history of acute vomiting, diarrhoea and anorexia. Bloodwork reveals an increased haematocrit (0.70 l/l). Which of the following possibilities is the most likely cause of the polycythaemia?
  - (A) Relative polycythaemia
  - (B) Polycythaemia vera
  - (C) Appropriate secondary polycythaemia
  - (D) Inappropriate secondary polycythaemia
2. Which of the following will be seen in dogs with polycythaemia vera?
  - (A) An increased erythropoietin production due to local renal hypoxia
  - (B) An increased autonomous erythropoietin production
  - (C) A low or normal erythropoietin concentration
  - (D) Abnormal erythrocytes circulating in the peripheral blood
3. Which of the following diagnostic tests is the most important in discriminating the different causes of absolute polycythaemia?
  - (A) Ultrasonography of the kidneys
  - (B) Radiography of the lungs
  - (C) Bone marrow aspirate
  - (D) Plasma erythropoietin concentration

# Investigation of leucopenia

## Erik Teske

The blood leucocytes or white blood cells are the granulocytes (neutrophils, eosinophils and basophils), the lymphocytes and the monocytes. In addition to this, precursors may be observed in the blood in some conditions. So theoretically a shortage of any of these types of cells may lead to leucopenia. However, the number of eosinophils, basophils and monocytes in normal healthy individuals is so low that a decrease in number will not lead to leucopenia. Lymphopenia, but even more neutropenia, can result in overall leucopenia. Therefore, these conditions will be discussed further.

Lymphopenia is a common finding in dogs and cats. The most common cause is excess of corticosteroids (iatrogenic, hyperadrenocorticism or stress), possibly due to migration of lymphocytes from blood to lymphoid tissue. Other causes include disruption of lymphocyte circulation (chylothorax, lymphangiectasia), use of immunosuppressive drugs, viral infections (e.g. canine

distemper and parvovirus) and severe septicaemia (although a corticoid excess cannot be excluded as cause). Rarely, lymphopenia can be the result of congenital lymphocyte deficiency in the dog or cat.

Neutropenia usually has a more profound effect on the total number of leucocytes. It can be the result of decreased production in the bone marrow, cellular shifting from the circulating to the marginal pool, increased utilization and possibly immune-mediated destruction. Decreased production of neutrophils can occur due to a variety of causes, such as cytostatic drugs, irradiation or oestrogens; all kinds of idiosyncratic drug reactions may also result in leucopenia. In addition, infections, e.g. canine parvovirus, *Ehrlichia*, immune-mediated diseases and myeloproliferative diseases can cause a decreased production of leucocytes. A congenital form of neutropenia has been reported in grey collies (cyclic haemopoiesis). Neutropenia due to shifting from the circulating to the marginal pool is not uncommon, especially in cases with shock, anaphylaxis or toxemia. An increased utilization (often in localized purulent inflammations) can lead to a situation in which the bone marrow cannot compensate enough with increased production, leading eventually to leucopenia. Often immature stages (metamyelocytes and bands) are seen in the peripheral blood combined with the absence of neutrophilia (degenerative left shift).

## KEY LEARNING OBJECTIVES

- Recognizing patients with leucopenia
- Learning the differential diagnoses of leucopenia
- Learning the approach to patients with leucopenia

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is a dog with leucopenia most likely to have?
  - (A) An eosinopenia
  - (B) A monocytopenia
  - (C) A basophilopenia
  - (D) A neutropenia

2. A dog is presented with a lymphopenia. Which of the following conditions could be responsible for this?
  - (A) Hypoadrenocorticism
  - (B) Testicular Sertoli cell tumour
  - (C) Stress related
  - (D) Epinephrine-induced response
3. A shift of the neutrophils from the circulating pool to the marginated pool can be caused by which of the following?
  - (A) A severe fright reaction
  - (B) Severe stress
  - (C) Inflammation
  - (D) Cytostatic drugs

# Haemolytic anaemia: when is it not IMHA?

**Vicki Black**

Haemolysis is a term used to describe shortening of the circulating lifespan of a red blood cell. The normal circulating time is 110–120 days in a dog and 65–76 days in cats. Red blood cells pass over macrophages within the liver and spleen frequently throughout their lifespan, these macrophages are responsible for removal of aged blood cells from circulation; in a healthy state the rate of removal matches the rate of production of red blood cells.

Premature removal of red blood cells from circulation may occur due to intravascular haemolysis or extravascular haemolysis. Intravascular haemolysis occurs due to rupture of red blood cells within the circulation, whereas extravascular haemolysis describes phagocytosis of red blood cells by macrophages (usually within the spleen and liver). Intravascular haemolysis is characterized by haemoglobinuria and haemoglobinuria, and can be accompanied with ghost red blood cells, whereas extravascular haemolysis can result in spherocytes. Both intravascular and extravascular haemolysis can result in jaundice.

Haemolysis can also be considered based upon the underlying aetiology, and either categorized as hereditary or acquired. Hereditary non-immune haemolysis can occur due to enzymopathies, membrane defects or haemoglobin-related disorders. Enzymopathies are the best described in the dog and cat. They include phosphofructokinase deficiency of the English Springer Spaniel, American Cocker Spaniel, Cockapoo (American), German Spaniel (Wachtelhund), and Whippet, and pyruvate kinase deficiency in the Basenji, Beagle, Dachshund,

Eskimo, West Highland White Terriers, Pug, Abyssinian and Somali cats, as well as Domestic Shorthaired cats. Membrane defects have been described, including spherocytosis in the Golden Retriever, stomatocytosis in the Alaskan Malamute, and band 3 deficiency in a single Jack Russell Terrier. Haemoglobin-related disorders are less commonly described, and a human equivalent of sickle cell disease has not been established in the dog or cat, although congenital porphyria has been documented in the cat.

Acquired causes of non-immune haemolysis include: infections, drug or toxin-induced, aberrant macrophage activity, secondary to microangiopathies, or related to severe hypophosphataemia. Examples of infectious causes include *Babesia* sp., *Mycoplasma haemofelis* and *Leptospira* sp. Drugs and toxins include paracetamol or onion toxicosis in cats, zinc poisoning, and snake or bee envenomation. Aberrant macrophage activity can be observed in some reactive or neoplastic histiocytic disorders, for example haemophagocytic histiocytic sarcoma. Microangiopathies describes fragmentation injury to red blood cells related to a tortuous course and may be observed in vasculitis or disseminated intravascular coagulation of any cause. Finally, severe hypophosphataemia is an uncommon cause of haemolysis, but when observed is most frequently in the context of diabetic ketoacidosis.

## KEY LEARNING OBJECTIVES

- Appreciate non-immune haemolytic anaemia should be suspected in animals with evidence of haemolysis that do not present with investigation findings compatible with immune-mediated destruction
- Understand the approach to non-immune haemolytic anaemia
- Appreciate hereditary non-immune haemolysis is probably an underdiagnosed condition, although clinical significance may be minimal



## MULTIPLE CHOICE QUESTIONS

1. What is the diagnostic test of choice for phosphofructokinase (PFK) deficiency in the English Springer Spaniel?  
(A) Blood smear  
(B) Coomb's test  
(C) Genetic test  
(D) Osmotic fragility
2. What is the cause of anaemia in heat stroke?  
(A) Disseminated intravascular coagulation  
(B) Hypophosphataemia

- (C) Immune-mediated haemolytic anaemia  
(D) Toxic injury
3. Which of the following is associated with a good prognosis?  
(A) Phosphofructokinase deficiency in English Springer Spaniels  
(B) Pyruvate kinase deficiency in West Highland White Terriers  
(C) Pyruvate kinase deficiency in Abyssinian cats  
(D) Stomatocytosis in Alaskan Malamutes

Friday 5 April  
Hall 8

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# AVP

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- 76 14:05–14:50  
**Management of intraoperative hypotension**  
Delphine Holopherne-Doran
- 77 15:00–15:45  
**Infection control for the surgical patient**  
Kelly Bowlit Blacklock
- 78 16:50–17:35  
**Top tips for great medical and surgical case reports**  
Ian Ramsey and Rachel Hattersley
- 79 17:45–18:30  
**Options for the treatment of combined cranial cruciate ligament insufficiency and medial patellar luxation**  
Duncan Barnes

# Management of intraoperative hypotension

**Delphine Holopherne-Doran**

Hypotension, commonly defined as a mean arterial pressure below 60 mmHg, is one of the most common complications encountered in small animals under general anaesthesia. It is generally multifactorial, with the direct or indirect effects of the sedative/anaesthetic/analgesic drugs on the cardiovascular system playing a predominant part. Addressing hypotension under general anaesthesia can be done following a simple and logical algorithm.

Ensuring that the measurement of the low blood pressure is accurate is a preliminary step. Then most likely causes for the drop in blood pressure should be addressed. In most cases, a decrease in the amount of anaesthetic drugs administered will reduce the burden on the cardiovascular system and allow the blood pressure to come back within normal limits. Hence aiming to work with the lowest percentage of isoflurane or sevoflurane, for example, can be crucial. Obviously, if the main reason for the hypotension is a true hypovolaemia, due for example to blood losses during the ongoing procedure, fluid therapy is the logical first step of treatment. The choice of the most appropriate fluid in these circumstances will depend on the type of hypovolaemia, the severity of the losses and the objectives of the fluid resuscitation, especially in terms of timing. Whilst isotonic crystalloid solutions (Hartmann's or saline) are most commonly used, hypertonic crystalloid solutions, colloids or even blood products can have a role to play. The fluids also have a role to play in resuscitative treatment of the most common case of relative hypovolaemia under general anaesthetic, i.e. when the hypovolaemia is only due to an expansion of the vascular compartment in response to vasodilatory drugs. Isotonic crystalloids are usually used in that case, administered as a bolus which can be repeated. If the fluid therapy does not suffice to restore normal blood pressure, or if fluid therapy is contraindicated or limited, pharmaceutical intervention should be considered.

Blood pressure is the product of systemic vascular resistances and cardiac output, itself the result of stroke volume and heart rate, therefore drugs targeting at least one of these three parameters can be used to increase blood pressure. If the hypotension is associated with bradycardia, the use of an anticholinergic drug such as atropine or glycopyrrolate, should be considered first. If the heart rate is normal, and drug-induced vasodilation is

identified as the primary cause for the hypotension, a vasoconstrictor can be used. Whilst pure vasoconstrictors, such as phenylephrine, can be used, mixed sympathomimetic agents like ephedrine are often preferred. Ephedrine, acting by release of noradrenaline, induces vasoconstriction alongside an increase in myocardial contractility. In severe, or non-responsive, hypotensive cases, the use of noradrenaline could be considered. In cases where hypotension is specifically related to poor myocardial contractility and thus a low cardiac output, the use of a more specific positive inotrope, such as dobutamine, can be indicated.

## KEY LEARNING OBJECTIVES

- Describe the therapeutic steps to address hypotension under general anaesthesia
- Compare the different types of intravenous fluids used to counteract intraoperative hypotension
- Choose and justify the use of parasympatholytic and sympathomimetic drugs to treat intraoperative hypotension

## MULTIPLE CHOICE QUESTIONS

1. What would be the first step in addressing hypotension in a dog under general anaesthesia?
  - (A) Administer a 10 ml/kg intravenous bolus of Hartmann's solution
  - (B) Decrease the percentage of isoflurane delivered if anaesthetic depth allows
  - (C) Administer 10 µg/kg of glycopyrrolate
  - (D) Incline the table (head down) to optimize venous return
2. What acid–base imbalance can be expected when using saline for an aggressive fluid resuscitation?
  - (A) Hypochloraemic metabolic alkalosis
  - (B) Hypochloraemic metabolic acidosis
  - (C) Hyperchloraemic metabolic acidosis
  - (D) Hyperchloraemic metabolic alkalosis
3. What cardiovascular effects does ephedrine induce?
  - (A) Vasoconstriction and increased myocardial contractility
  - (B) Vasodilation and increased myocardial contractility
  - (C) Vasoconstriction and decreased myocardial contractility
  - (D) Vasodilation and decreased myocardial contractility

# Infection control for the surgical patient

Kelly Bowlt Blacklock

A surgical site infection (SSI) is one which occurs in the surgical site within 30 days of surgery (or one year if an implant is present). See Figure 1.

Wound classification	Description	SSI rate
Clean	Non-traumatic elective operative wounds	2–4.8%
	No entry into respiratory, gastrointestinal or urogenital tract	
Clean–contaminated	Clean procedure with placement of drain	3.5–5%
	Entry into respiratory, gastrointestinal or urogenital tract	
Contaminated	Major break in asepsis	4.6–12%
	Surgery on traumatic non-purulent wounds	
Dirty	Purulent discharge, foreign bodies, devitalized tissue	6.7–18.1%
	Major spillage from a viscus	

Figure 1: Infection rates seen in surgical wounds

## RISK FACTORS FOR INFECTION

### Patient considerations

- Surgical site preparation. Techniques for aseptic skin preparation generally include a chlorhexidine- or povidone-iodine-based preparation. Importantly, solutions of diluted chlorhexidine can harbour bacterial organisms, particularly *Pseudomonas*, so each batch of scrub solution should be made up as required and not stored
- Anaesthetic induction agent. Propofol is associated with increased SSI rates in some studies, presumably because of increased microbiological growth in the lipid-based emulsion. It is imperative that aseptic technique is utilized and that unused propofol is stored according to manufacturer's instructions
- Anaesthetic and surgical duration. Increasing duration of anaesthesia and surgery is associated with increased risk of an SSI
- Patient specific factors. There is an increased risk of SSI in patients with diabetes mellitus, hypothyroidism and hyperadrenocorticism
- Drapes. An impermeable drape should be incorporated into distal leg wraps where surgery on a limb is anticipated in order to prevent bacterial strike-through

### Staff considerations

- Theatre clothing. Masks should be disposable, changed between procedures (or sooner if damp) and should not be hung around the neck (which increases contamination) when not in use. Gloves should be worn to reduce wound contamination from the surgeon's hands
- Hand preparation. The World Health Organization (WHO) currently recommends the use of alcohol-based hand rubs

### Facility considerations

- Theatres. The theatre list should be planned such that clean procedures occur early in the day and dirty procedures are scheduled to follow. A detailed daily schedule of maintenance should be established for the perioperative environment to ensure it is clean, dry and dust free. Periodic deep cleaning at locally determined intervals may be used to target specific areas and ensure high standards are maintained
- Instrumentation. Instruments should be rinsed and cleaned manually or mechanically using a commercial cleaner. Sterilization of the packaged instruments can occur by steam, ethylene oxide, plasma sterilization, radiation (gamma) or cold sterilization (e.g. glutaraldehyde). It is imperative that indicators are used to demonstrate that the method of sterilization has been effective. Once sterilized, packs should be stored for a limited period only in closed cabinets in a low-traffic area
- Tissue. The risk of an SSI can be minimized by adhering to Halstead's surgical principles

## ANTIBIOTIC USE

Complete discussion regarding the use of antibiotics is outside the scope of this session but should not be used to compensate for poor preparation of the patient, surgeon or facilities.

## ACTIVE INFECTION SURVEILLANCE

Where possible, regular infection-control group meetings within the hospital are beneficial. Any SSIs should be prospectively recorded and reviewed monthly to determine rates between procedures, surgeons, theatres, days of the week etc. In this way, the adequacy of current protocols can be assessed and any alterations required can be implemented.

## KEY LEARNING OBJECTIVES

- Identify key aspects of patient and environmental perioperative care which contribute to surgical site infections
- Make informed choices about surgical hand hygiene
- Understand how to operate an active infection surveillance system within the practice

## MULTIPLE CHOICE QUESTIONS

- Which of the following is true about a surgical site infection (SSI)?
  - It occurs any time postoperatively
  - It occurs within the first 10 days postoperatively
  - It occurs within the first year if an implant is present
  - It occurs within the soft tissue only

- How is surgery on traumatic non-purulent wounds classified?
  - Dirty
  - Clean
  - Contaminated
  - Clean-contaminated
- Which of the following patient conditions is associated with increased risk of SSI?
  - Diabetes mellitus
  - Hypothyroidism
  - Hyperadrenocorticism
  - All of the above

## Top tips for great medical and surgical case reports

Ian Ramsey and Rachel Hattersley

The RCVS Certificate in Advanced Veterinary Practice (CertAVP) is a flexible, modular approach to achieving veterinary postgraduate qualifications. You can design your own postgraduate certificate by choosing a combination of modules, or pursue one of the designated (named) qualifications. The majority of such certificates will require candidates to write case reports based on patients which they have treated in the clinic. The lecture will focus on the dual areas of appropriate case selection and making the most out of your 'write-up'.

### CASE SELECTION

- Avoid cases where the animal or owner (including financial issues) were a significant limiting factor in your diagnosis or management of the case (e.g. in cases of surgical oncology – histology must be performed)
- Avoid cases where the primary diagnosis was not confirmed but rather arrived at by a circuitous route (e.g. by response to treatment or by exclusion)
- Avoid cases whose primary management was not the discipline you are studying (e.g. surgery in a medicine case report or vice versa)
- Avoid excessively rare cases or ones that the examiners may not be familiar with (e.g. certain exotic diseases that are not present in the UK)
- Avoid the utterly routine and the excessively easy
- Make sure you have all the details about the case before you start writing (e.g. the imaging and an appropriate length of follow-up)
- Make sure you have the owner's permission (as you will want to keep in touch!)
- Don't be frightened to ditch a case that you have started writing up if the outcome is not ideally suited

to purpose – it is not wasted time as you will have learnt from it

- Do not use a case that was substantially diagnosed or managed by someone else (e.g. a referral centre)

### WRITING UP

- Make sure you plan well ahead. Your first case will take at least a week of evenings to write up. Your last case will also take a week to write up
- Use appropriate scientific language (e.g. radiograph not X-ray)
- Your differential diagnosis list should be relevant to the individual case and particular set of clinical signs you are describing; avoid copying a list *ad verbatim* from a textbook
- Get several peer-reviewed references, read them and make sure you understand them. Use PubMed not Dr Google to find these references. Read the abstract, if they are appropriate then get the whole paper
- Read the papers fully to ensure that the paper supports the statement you have made – do not reference the introduction of a paper which is referencing the findings of another paper
- Do not reference In Practice or Vet Times articles, and where possible avoid referencing textbooks. Use common sense and look at the most recent papers first
- Include pictures that illustrate a point and all relevant laboratory data (with reference ranges). Try to get images of surgery, cytology, radiology and ultrasonography
- Review what you have read, get a friend/mentor to check what you have written. They will notice things and bits they do not understand that seem perfectly clear to you. This is allowed. They must not correct the work – but you can
- Use spelling and grammar checkers. If Word thinks it is wrong, it probably is
- Never fabricate data or images
- Never copy whole sentences without citation and remember that using more than a whole sentence requires quotation marks as well. Be aware that the majority of marking systems have software which will detect plagiarism

- Ensure you interpret all abnormalities (even if only to say they were not considered significant)
- Your discussion should be relevant to the case and usually is a place to reflect on how you have managed the case and how you would improve that management based on the results of your research

# Options for the treatment of combined cranial cruciate ligament insufficiency and medial patellar luxation

## Duncan Barnes

Cranial cruciate ligament insufficiency (CCLI) and medial patellar luxation (MPL) are common causes of lameness in dogs and will often occur concomitantly. The presence of CCLI can contribute to the pathogenesis of MPL and vice versa. CCLI can cause biomechanical changes which promote medial patellar luxation, including:

- Increased internal rotation of the tibia relative to the femur
- A reduction in the retropatellar force which pushes the patella into the trochlear groove
- Progressive collapse of the medial stifle compartment

The presence of MPL may lead to CCLI as a result of:

- Increased and abnormal loading of the CCL when the patella is luxated
- The presence of degenerative joint disease and inflammatory mediators which result in degeneration of the cranial cruciate ligament

Careful preoperative assessment is essential to allow the rational selection of treatment options for combined CCLI/MPL. Assessment should include:

- Full clinical history, gait assessment and clinical examination
- Patellar luxation grade
- Degree of stifle instability:
  - Amount of cranial drawer
  - Degree of rotational instability of the tibia relative to the femur
- Hind limb bone conformation:
  - Presence or absence of angular limb deformity such as distal femoral varus, femoral torsion, tibial valgus/varus
  - Tibial plateau angle
- Condition of the femoral trochlear and caudal articular surface of the patella:

## KEY LEARNING OBJECTIVES

- To help candidates identify an appropriate case to use
- How to perform a useful search of the available literature
- Identifying and avoiding commonly made mistakes

- Degree of crepitus on manipulation of the patellofemoral joint
- Computed tomography (CT) contrast arthrography to identify the degree of articular cartilage erosion
- Visual assessment at surgery

Several treatment options are available for combined CCLI/MPL. By carefully considering the reasons for CCLI/MPL in an individual patient we can tailor the surgical approach, improving the clinical outcome and reducing the incidence of complications. Treatment options include:

- Conservative treatment
- Routine treatment for the predominant lesion
- Routine treatment of MPL (tibial tuberosity transposition (TTT), block recession trochleoplasty (BRT), lateral retinacular imbrication) with the addition of a lateral extracapsular suture to control cranial drawer and internal rotation of the tibia relative to the femur
- Transposed tibial plateau levelling osteotomy (TPLO) + BRT + lateral retinacular imbrication
- TPLO + TTT + BRT + lateral retinacular imbrication
- TPLO + patellar groove replacement
- Distal femoral ostectomy + BRT + TTT + TPLO

In this lecture we will look at the options for treatment and the situations in which each would be selected.

## KEY LEARNING OBJECTIVES

- Understand how the pathogenesis of cranial cruciate ligament insufficiency (CCLI) and medial patellar luxation (MPL) are related and the effect of this on the selection of treatment options
- Understand how to objectively assess cases with combined MPL and CCLI
- Consider the pros and cons of the treatment options available for combined MPL and CCLI

## MULTIPLE CHOICE QUESTIONS

1. What biomechanical factors can promote medial patellar luxation following cranial cruciate ligament rupture?
  - (A) Loss of constraint to internal rotation of the tibia relative to the femur
  - (B) Decreased retropatellar force
  - (C) Genu varum resulting from medial femorotibial joint collapse
  - (D) All of the above

2. Which treatment option is most useful when there is severe malformation or erosion of the femoral trochlear groove?

- (A) Distal femoral ostectomy
- (B) Patellar groove replacement
- (C) Lateral retinacular imbrication
- (D) Rectus femoris release

3. Which trochleoplasty technique results in the greatest area of articular cartilage contact between the patella and the trochlear groove?

- (A) Abrasion trochleoplasty
- (B) Wedge recession trochleoplasty
- (C) Block recession trochleoplasty
- (D) Patellar groove replacement



Friday 5 April  
Hall 8

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# Bourgelat

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- 82 08:30–09:15  
**Imaging the adrenals**  
Raquel Salgüero
- 82 09:25–10:10  
**Atypical hypoadrenocorticism**  
Michael Herrtage
- 84 11:05–11:50  
**The diagnosis of canine hyperadrenocorticism. Is it always straightforward?**  
Michael Herrtage
- 85 12:00–12:45  
**Monitoring treatment in canine hyperadrenocorticism**  
Ian Ramsey

## Imaging the adrenals

Raquel Salgüero

The adrenal glands are two small glands located in the retroperitoneal space, cranial and medial to the kidneys. They are divided in two parts: the outer cortex and the inner medulla. The adrenal cortex is divided into three zones which are indistinct: the zona glomerulosa is the outer one and produces mineralocorticoids (aldosterone), the zona fasciculata secretes glucocorticoids (cortisol) and the reticularis zone secretes sex hormones (progesterone, oestrogens and androgens). The medulla plays an important role in stress and hypoglycaemia, as it produces epinephrine (adrenaline) and norepinephrine. Because of their hormone production, adrenal glands are involved in several important systemic pathologies of our patients, such as hyperadrenocorticism (Cushing's disease), hypoadrenocorticism (Addison's disease), hypertension and neoplasia. Because of this, correct knowledge their location, and identification of normal and pathological appearances, in the different imaging modalities are necessary.

Identification of normal adrenal glands in abdominal radiographs is not possible due to their small size. Some cats can have mineralized adrenal glands and, in those cases, these will be seen due to their different opacity. Adrenal gland changes can be identified in radiographs in cases of mineralization, or when large masses are present and produce a mass effect displacing the adjacent organs.

Ultrasonography has been the gold standard technique to diagnose adrenal gland changes in small animal practice thanks to its availability and sensitivity. In normal cats, adrenal glands have an oval or bean shape and are hypoechoic. In dogs, the shape can vary but the left one frequently has a peanut shape and the right one a more oval shape. Knowing the normal appearance will be helpful to identify any possible pathological change.

With the increase of cross-sectional imaging (mainly computed tomography), finding incidental adrenal lesions (incidentalomas) has become more common

(hyperplasia, adenomas). Ultrasonography and computed tomography are more sensitive to visualize normal and pathological glands as there is no superimposition of different organs and they are able to show different densities.

This lecture will focus on the imaging appearance of adrenal glands in dogs and cats. A brief introduction to the anatomy, localization, normal appearance in radiology, ultrasonography, computed tomography and magnetic resonance imaging will be included, as will their appearance in the most common adrenal gland pathologies.

### KEY LEARNING OBJECTIVES

- Understand localization of the adrenal glands in ultrasonography and radiology
- Use of abdominal radiographs to identify adrenal pathologies
- Knowledge of the ultrasonographic appearance of the adrenals in the most common pathologies

### MULTIPLE CHOICE QUESTIONS

1. What is the size of the adrenal glands in cases of hypoadrenocorticism?  
(A) <3 mm  
(B) 7–10 mm  
(C) >7 mm  
(D) >10 mm
2. What is the most common ultrasound appearance of the adrenals in cases of pituitary-dependent hyperadrenocorticism?  
(A) Small adrenal size  
(B) Bilateral adrenal enlargement  
(C) Adrenal mass  
(D) Normal adrenal size
3. Which adrenal neoplasia secretes epinephrine?  
(A) Carcinoma  
(B) Adenoma  
(C) Pheochromocytoma  
(D) Myelolipoma

## Atypical hypoadrenocorticism

Michael Herrtage

Hypoadrenocorticism is a syndrome that results from a deficiency of both glucocorticoid and mineralocorticoid secretion from the adrenal cortices. Destruction of more than 95% of both adrenal cortices causes a clinical deficiency of all adrenocortical hormones and is termed primary hypoadrenocorticism (Addison's disease). Secondary hypoadrenocorticism is caused by a deficiency in adrenocorticotrophic hormone (ACTH), which leads

to atrophy of the adrenal cortices and impaired secretion of glucocorticoids. The production of mineralocorticoids, however, usually remains adequate. Atypical hypoadrenocorticism is the term used to describe cases of primary hypoadrenocorticism in which the serum sodium and potassium concentrations at the time of testing are within their reference ranges.

Primary hypoadrenocorticism is uncommon in the dog but is probably underdiagnosed because of the vague and non-specific clinical signs.

### PATHOPHYSIOLOGY

Loss of or damage to the adrenal cortex leads to mineralocorticoid and glucocorticoid deficiency. Aldosterone is the major mineralocorticoid and deficiency causes

impaired ability to conserve sodium and water and failure to excrete potassium, leading to hyponatraemia and hyperkalaemia. Hyponatraemia induces lethargy, depression, and nausea and leads to the development of hypovolaemia, hypotension, reduced cardiac output and decreased renal perfusion. Hyperkalaemia causes muscle weakness, hyporeflexia and impaired cardiac conduction. Glucocorticoid deficiency causes decreased tolerance of stress, loss of appetite and a mild normocytic normochromic anaemia.

## CLINICAL SIGNS

There are no breed predilections but the possibility of an hereditary factor has been suggested in some breeds. Hypoadrenocorticism appears to be a disease of the young and middle-aged dog with an age range of 3 months to 9 years and a median age of 4–5 years. Approximately 70% of reported cases are female. The progression of adrenocortical insufficiency may be acute or chronic. Chronic hypoadrenocorticism is more common than the acute disease in the dog.

### Acute primary hypoadrenocorticism

The clinical appearance of the acute form is that of hypovolaemic shock (adrenocortical crisis).

### Chronic primary hypoadrenocorticism

The clinical signs in the chronic form are often vague and non-specific. The diagnosis should be considered in any dog with a waxing and waning type of illness or which shows episodic weakness and collapse.

## DIAGNOSIS

Haematological changes may include lymphocytosis, eosinophilia and mild normocytic, normochromic non-regenerative anaemia. However, these findings are not as consistent as the changes seen in hyperadrenocorticism.

The most consistent laboratory findings in hypoadrenocorticism are prerenal azotaemia, hyponatraemia and hyperkalaemia. Sodium is usually  $<135$  mmol/l and potassium  $>5.5$  mmol/l. Approximately 10% of cases may have normal electrolyte concentrations at the time of presentation and these are described as atypical hypoadrenocorticism.

### Endocrine testing

Basal serum cortisol concentration has been shown to be a useful screening test for dogs with signs compatible with hypoadrenocorticism. The disease is unlikely in dogs if the serum cortisol concentration is  $>55$  nmol/l. Basal cortisol concentrations  $<55$  nmol/l cannot confirm a diagnosis of hypoadrenocorticism and an ACTH stimulation test should be performed.

The ACTH stimulation test is the 'gold standard' diagnostic test to confirm the presence of hypoadrenocorticism. Whilst aldosterone concentrations pre- and post-ACTH are not routinely measured, they have proved to be useful in addition to cortisol concentrations in those cases with normal electrolyte concentrations, to determine whether mineralocorticoid supplementation is likely to be indicated.

Plasma ACTH concentrations are required to differentiate primary and secondary hypoadrenocorticism. Plasma ACTH concentrations are low in secondary hypoadrenocorticism and markedly raised in primary hypoadrenocorticism.

## KEY LEARNING OBJECTIVES

- The definition of atypical hypoadrenocorticism
- Electrolyte abnormalities can be quickly corrected by intravenous fluid therapy
- Measuring serum aldosterone can help in determining whether mineralocorticoid supplementation is likely to be required

## MULTIPLE CHOICE QUESTIONS

1. Atypical hypoadrenocorticism is a diagnosis made when which one of the following statements is satisfied?
  - (A) The clinical signs are unusual
  - (B) The serum sodium and potassium concentrations are normal
  - (C) The ACTH-stimulation test does not confirm the diagnosis
  - (D) The patient is only deficient in glucocorticoid production
2. Primary (as opposed to secondary) hypoadrenocorticism is confirmed by which one of the following tests?
  - (A) A plasma ACTH concentration
  - (B) Plasma cortisol concentrations before and after ACTH stimulation
  - (C) Serum sodium:potassium ratio of less than 25:1
  - (D) Plasma aldosterone concentrations before and after ACTH stimulation
3. Which statement best describes primary hypoadrenocorticism?
  - (A) It is usually an inherited disease in most breeds
  - (B) It only affects young adults between 1 and 3 years of age
  - (C) The clinical signs are usually pathognomonic
  - (D) It is usually caused by an immune-mediated destruction of the adrenal cortex

## The diagnosis of canine hyperadrenocorticism. Is it always straightforward?

Michael Herrtage

Diagnostic testing for canine hyperadrenocorticism (HAC) should be performed only when there is a strong clinical suspicion of the disease. The ACVIM consensus statement for diagnosis of HAC recommended testing only when there is compatible history and physical examination findings; when a pituitary macroadenoma has been identified; when a dog with diabetes mellitus shows insulin resistance not easily attributed to other causes; when an adrenal mass has been identified; or when there is persistent hypertension. Biochemical or haematological abnormalities were not deemed by themselves an indication to pursue diagnostic testing. Also, if a dog has a serious illness, endocrine testing should be postponed, as it can affect the results of screening tests.

### SCREENING TESTS

Screening tests are not necessarily diagnostic, but, instead, may identify individuals more likely to have the disease. In order to realize how good (or bad) a test is, one should understand the terms sensitivity and specificity, as these terms are used to evaluate the performance of these screening tests. The sensitivity of the test reflects the probability that the test will be positive among those dogs which are diseased (i.e. reflects the prevalence of false-negative results), and the specificity of the test reflects the percentage of individuals without the disease who have a negative result (i.e. reflects the prevalence of false-positive results). As no screening test has 100% accuracy, diagnostic testing for naturally occurring HAC should be performed only when there is a strong clinical suspicion, otherwise false-positive results will occur. In the same way, if there is a strong clinical suspicion of naturally occurring HAC and a test result is negative, an alternative screening test should be performed.

### Low-dose dexamethasone-suppression test

Although the low-dose dexamethasone-suppression test (LDDST) is considered the test of choice for diagnosing HAC, it takes time to complete and is affected by more variables. The sensitivity of the LDDST is high (ranging from 85–100%). However the specificity for the LDDST is low as (range 44–73%), especially when assessed in a population of dogs with non-adrenal illness.

In cases where an adrenal mass has been previously identified, the LDDST is undoubtedly the test of choice due to the fact that the test is diagnostic in nearly all dogs with cortisol-secreting adrenocortical tumours.

### ACTH stimulation test

The adrenocorticotrophic hormone (ACTH) stimulation test is the gold standard for diagnosis of iatrogenic HAC. Despite being used frequently to diagnose naturally occurring HAC, it is not the first-line test currently recommended in the latest ACVIM consensus statement. The sensitivity of the ACTH stimulation test in dogs with suspected pituitary-dependent HAC (PDH) ranges from 80–83%. The main limitation of this test is in dogs with suspected ADH where the sensitivity is low (57–63%), so a negative result does not exclude the diagnosis of ADH. Specificity ranges from 59–93%.

The ACTH stimulation test can, however, be used in cases of suspected atypical HAC. Measurement of 17-hydroxyprogesterone (17-OHP) before and after ACTH can help diagnose atypical HAC by documenting an exaggerated response to ACTH.

### Urine cortisol to creatinine ratio

The reported specificity when using a single urine cortisol to creatinine ratio (UCCR) is very low (20–25%). The specificity of the test increases if two separate urine samples are collected. Sensitivity is, on the other hand, quite high (75–100%), so it is actually a good test to rule out HAC (as a negative test will make HAC an unlikely diagnosis).

### KEY LEARNING OBJECTIVES

- An understanding of the terms 'sensitivity' and 'specificity' as they relate to the three screening tests for canine hyperadrenocorticism
- The advantages and disadvantages of each of the three screening tests
- An appreciation of the term 'atypical' hyperadrenocorticism

### MULTIPLE CHOICE QUESTIONS

1. Which of the following statements best describes a low-dose dexamethasone-suppression test?
  - (A) It will always give a positive result in the presence of canine hyperadrenocorticism
  - (B) It is affected by more variables than the ACTH stimulation test
  - (C) The specificity of the LDDST is higher than that of the ACTH stimulation test
  - (D) Serum cortisol assays reliably give similar results

2. Which one of the following statements best fits with a urine cortisol to creatinine ratio?
  - (A) A single measurement is specific for the diagnosis of hyperadrenocorticism
  - (B) The result is less affected by stress than are other screening tests
  - (C) It is a good screening test to exclude the possibility of hyperadrenocorticism

- (D) Timing and method of sampling do not affect the result
3. Adrenal-dependent hyperadrenocorticism is best diagnosed by which of the following tests?
  - (A) An ACTH stimulation test
  - (B) A low-dose dexamethasone-suppression test
  - (C) Clinical signs
  - (D) Abdominal ultrasonography

## Monitoring treatment in canine hyperadrenocorticism

Ian Ramsey

Hyperadrenocorticism (HAC) is commonly treated with trilostane. This treatment is usually monitored using a combination of clinical signs and adrenocorticotrophic hormone (ACTH) stimulation tests, despite this test having never being validated for this purpose. As trilostane is relatively short acting, there is considerable variation in the results from ACTH stimulation tests even in dogs on the same long-term dose. Moreover, sometimes when ACTH stimulation tests demonstrate very low levels of cortisol, dogs may continue to be treated with the same dose of trilostane, as these low cortisol levels are only short lived. In addition, in some countries ACTH is expensive or hard to obtain. Efforts have been made to find an alternative to ACTH stimulation tests and the result is pre-trilostane cortisol monitoring. This technique appears to be cheaper, easier and better correlated with clinical control than performing ACTH stimulation tests. This talk will describe the research behind this technique and provide recommendations on how to interpret the results (Figure 1).

The aim of trilostane therapy should be to satisfactorily control clinical signs, without resulting in iatrogenic

hypocortisolism. Using a target range of 40–138 nmol/l, the pre-trilostane cortisol concentrations were found to be better than the post-ACTH cortisol concentrations at discriminating between dogs whose HAC was well controlled and those that were undercontrolled with a sensitivity of 55.4% and a specificity of 86.5%. In addition, pre-trilostane monitoring may be better able to identify oversuppression, when the result is less than 40 nmol/l, but further research is needed. No cortisol result correlated well enough with the clinical score to be used as a standalone monitoring test.

The studies that have been performed to date question the existing recommendations that ACTH stimulation tests should be used to ensure either adequate control or to detect dogs with oversuppression. Pre-trilostane cortisol appears to be an objective measurement that has the potential to balance safety with effective therapy, however further studies are needed. The importance of owners and clinicians' observations is paramount. This monitoring technique can also be used in dogs that receive twice daily trilostane or that have adrenal tumours. The effect of stress on pre-pill cortisol has not been fully investigated yet but there is a strong suspicion that it may be a significant effect, so it is recommended that efforts should be made to reduce stress at the time of sampling.

### DECLARATION OF CONFLICT OF INTEREST

The study was funded by Dechra® Veterinary Products.

### KEY LEARNING OBJECTIVES

- Understand the central importance of a good clinical history and the role that an owner's records can play in monitoring treatment of any endocrine disease
- Understand the limitations of ACTH stimulation tests in monitoring trilostane treatment
- Know how to perform and interpret pre-trilostane cortisol measurements

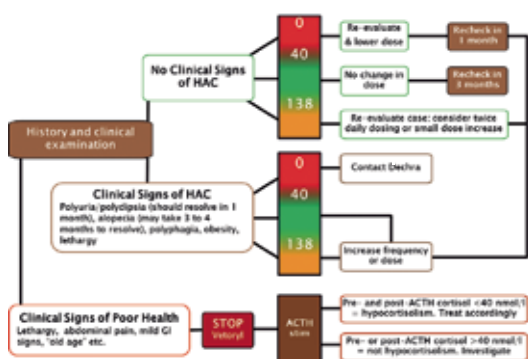


Figure 1: Interpretation of pre-trilostane monitoring.

### MULTIPLE CHOICE QUESTIONS

1. You are presented with a 13-year-old female neutered Bichon Frise that is being treated with trilostane for confirmed hyperadrenocorticism. The dog has a 1-week history of vague lethargy but the owner reports no recent changes in appetite, thirst, urination and defecation.

A detailed clinical examination is unremarkable. A pre-pill cortisol is 35 nmol/l. What should you advise the client, assuming that cost is not a factor for any of the options?

- (A) Stop trilostane and perform an ACTH stimulation test tomorrow
  - (B) Stop trilostane and test thyroxine (T4) and thyroid-stimulating hormone (cTSH) tomorrow
  - (C) Stop trilostane for 1 week and see how the dog does
  - (D) Stop trilostane for 1 week and start prednisolone
2. You are presented with a 10-year-old 8-kg male Yorkshire Terrier cross that is being treated with 10 mg trilostane once daily for confirmed hyperadrenocorticism. The dog is still polyuric despite 1 month of treatment, however he is livelier and less polydipsic than he was. A detailed clinical examination is unchanged (he is still alopecic). A pre-trilostane cortisol is 235 nmol/l. What should you advise the client assuming that cost is not a factor for any of the options?
- (A) Don't change the dose of trilostane just yet and recheck in 1 month as is starting to improve

- (B) Increase the dose of trilostane to 20 mg once daily

- (C) Increase the dose of trilostane to 10 mg twice daily

- (D) Increase the dose of trilostane to 15 mg once daily

3. You are presented with a 10-year-old 32-kg female neutered Greyhound that has been treated with 60 mg trilostane twice daily for 4 months for confirmed pituitary-dependent hyperadrenocorticism due to a macroadenoma. The dog is still massively polyuric despite treatment, however she is livelier and less polyphagic than she was. Her mild alopecia has resolved. A pre-trilostane cortisol is 50 nmol/l. Urine culture is negative but there is significant proteinuria. What treatment (reason) should you advise the client assuming that cost is not a factor for any of the options?

- (A) Course of antibacterials (pyelonephritis)

- (B) DDAVP treatment trial is warranted (central diabetes insipidus)

- (C) Increase the dose of trilostane to 90 mg twice daily (treatment underdose)

- (D) Switch to mitotane treatment (treatment failure)

# Friday 5 April

## Arena Lecture Theatre

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# CT

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- 88 09:00–09:45  
**I want a CT scanner: considerations prior to purchase**  
Chris Warren-Smith
- 89 09:50–10:30  
**I have a CT scanner: what now?**  
Matthew Winter
- 89 11:05–11:50  
**How to look at a CT scan: a beginner's guide**  
Matthew Winter
- 90 12:00–12:45  
**Breathe in: thoracic CT**  
Chris Warren-Smith
- 91 14:05–14:50  
**Around the abdomen: indications for abdominal CT**  
Matthew Winter
- 92 15:00–15:45  
**A headache or a pain in the neck? Head and neck CT**  
Chris Warren-Smith
- 93 16:50–17:35  
**Give the dog a bone: orthopaedic CT**  
Chris Warren-Smith
- 94 17:45–18:30  
**Could I, should I, would I? When can I use spinal CT?**  
Matthew Winter



# I want a CT scanner: considerations prior to purchase

**Chris Warren-Smith**

When deciding to install a computed tomography (CT) scanner there are four main factors to consider:

- What type of scans will I perform?
- Where will the scanner be situated?
- Who will acquire and read the images?
- Image storage and utilization

The type of scans to be performed affects the required type of scanner. Two distinct technologies exist, fan-beam or conventional CT scanners and cone-beam scanners (sometimes listed as veterinary specific). Fan-beam CT is more common and can be used for many different pathologies but the scanners are generally more expensive. Cone-beam CT units are smaller and use a flat panel detector similar to a DR x-ray unit. Generally, cone-beam CT units are less expensive to purchase.

New and second-hand scanners are available. New units will represent recent technology and be provided with warranties. Reconditioned units are cheaper to acquire than new units but are often refurbished with the most important components replaced. However, reconditioned scanners may represent older technology and run a higher risk of mechanical breakdown than new units.

Fan-beam units are considered all-rounders with fast acquisition and good spatial and contrast resolution. This makes them good for imaging all areas of the body, although very small body parts will suffer from limited spatial resolution. Cone-beam CT was originally designed for dental acquisition in human medicine. Cone-beam has superior spatial resolution to fan-beam CT for small regions, however for larger areas it will suffer from distortion and scans will be slower than on a fan-beam unit. It also has lower contrast resolution than a fan-beam unit. Therefore, for imaging bone structures within the head and for smaller musculoskeletal applications, cone-beam CT may be superior to fan-beam but it remains suboptimal for thoracic and abdominal studies.

Space is also often a premium when considering CT installation. Fan-beam units require larger rooms than cone-beam units and require extensive lead shielding installation to prevent scatter, while cone-beam units

may be used in existing x-ray rooms and may not require additional shielding. The electricity requirements are also different, with fan-beam units requiring three-phase power, leading to expensive upgrade costs to power supplies and a higher running cost. Cone-beam units may operate from standard 230-V supplies.

CT scanners are complicated units so who operates the unit is important. Ideally a trained radiographer should be acquiring images but if not then ideally limiting the number of operators will result in better scans as they become more rapidly comfortable with the unit. It is then important to consider who will read the scans. Images may be easily transmitted to teleradiology providers, but with study sizes ranging from 0.5–1 Gb in size, a fast network connection is essential. Similarly, storage of the images will occupy significantly more space than for standard radiographs (approximately 10–20 Mb/image).

## KEY LEARNING OBJECTIVES

- Fan-beam computed tomography (CT) scanners are all-round scanners appropriate for all scanning
- Cone-beam CT scanners are appropriate for the skull and some joints but not for thoracic or abdominal scanning
- Large amounts of image storage capacity will be necessary compared to standard radiographs

## MULTIPLE CHOICE QUESTIONS

1. A 'multislice' scanner is defined as a scanner with what number of slices?
  - (A) 4 or higher
  - (B) 8 or higher
  - (C) 16 or higher
  - (D) 64 or higher
2. What is the approximate average radiation dose from a thoracic CT scan?
  - (A) 0.1 mSv
  - (B) 3 mSv
  - (C) 7 mSv
  - (D) 15 mSv
3. Which key component of the scanner is typically not covered in basic service contracts?
  - (A) Patient bed
  - (B) Detector bank
  - (C) X-ray tube head
  - (D) Cooling system

# I have a CT scanner: what now?

**Matthew Winter**

Computed tomography (CT), is similar to radiography in that x-rays (ionizing radiation) are used to penetrate the patient, and transmitted x-rays are detected to generate an image. The similarities stop there. While the physics of CT are beyond the scope of this discussion, it is important to note that CT is a cross-sectional imaging modality that creates 'slices' of anatomy, eliminating the superimposition and distortion that hampers radiographic examination. In addition, CT technology uses calculations of attenuation coefficients to characterize tissues and fluids more accurately and objectively, based on their attenuation of x-rays. Attenuation of tissues can be objectively measured using Hounsfield Units, named for one of the inventors of CT. Therefore, in addition to eliminating superimposition, tissue contrast is superior to that of radiographs. CT can distinguish some fluids from soft tissues and can aid in the distinction between some different types of soft tissue structures from one another.

Spatial resolution has progressively increased over time. Recent technologies provide thin slices and exceptional spatial resolution. This means that very small structures can be detected, and two small structures located in close proximity to one another can distinguished as separate.

The recent advances in technology have increased the speed with which a patient can be imaged. The mechanics of the rotating tube and detector array have improved dramatically, improving the speed with which a scan can be completed. Similarly, continuing advances in computing algorithms and processing speed have significantly decreased reconstruction time, meaning that the images are available for review quickly. Combine this with teleradiology, the ability to send images anywhere in the world rapidly with a few clicks, and you have access to world-class image interpretation for your acquired studies.

## CONCLUSION

The rapid evolution of CT and the increasing accessibility of this technology to veterinarians is elevating the use of imaging in daily practice and improving the standard of patient care. There are more uses than those that I have listed above, and the utility of CT in practice continues to grow. CT is not necessary for all work-ups, and radiography remains one of the best, most available, fastest and inexpensive screening tests for the majority of routine imaging needs. However, for more advanced work-ups, CT is quickly becoming indispensable.

## KEY LEARNING OBJECTIVES

- Computed tomography (CT) is a cross-sectional imaging modality that eliminates superimposition of structures
- Spatial and contrast resolution of CT compared to radiographs is superior
- CT can be used for a multitude of applications, and is becoming more and more available and convenient

## MULTIPLE CHOICE QUESTIONS

1. Why is CT awesome?
  - (A) It has high spatial resolution
  - (B) It has high contrast resolution
  - (C) It eliminates superimposition of other structures
  - (D) All of the above
2. By what can a CT examination be limited?
  - (A) Gas in the intestines
  - (B) Fluid in the peritoneal space
  - (C) Metallic implants
  - (D) Faeces
3. What does CT use to measure density of tissue?
  - (A) The same system as radiographs
  - (B) Calculation of linear attenuation
  - (C) Calculation of McCormack units
  - (D) Echogenicity of tissue

# How to look at a CT scan: a beginner's guide

**Matthew Winter**

For all image interpretation it is important to use a systematic approach. In fact, the evaluation of advanced imaging studies deviates minimally from the approach used for the evaluation of radiographs. Yet evaluation of advanced imaging modalities seems far more daunting, primarily because there is more information, and more to see. The key ingredients for successful and accurate image interpretation remain standard: namely, using a

systemic, modified Roentgen sign approach, having a thorough understanding of anatomy and anatomical variation, and having a firm grasp of pathophysiological mechanisms.

Remember too that imaging tests rarely reveal the single, one-and-only true answer. In general, the purpose of an imaging test is to narrow the list of differential diagnoses, or to decrease the level of uncertainty. Imaging findings are always interpreted in the context of the clinical signs and the results of other diagnostics, and, together, these will help direct your next diagnostic or therapeutic steps. For this reason, synthesis is the fusion of the art and the science of image interpretation. The value of good image interpretation is the assignment of accurate value to imaging findings, and correlation with appropriate pathophysiological mechanisms.

## CONCLUSION

Having a systematic approach is key to successful image interpretation. In addition, it is critical that information be organized in a way that facilitates synthesis so that accurate conclusions can be drawn, a succinct and prioritized differential list can be generated, and appropriate next steps chosen.

## KEY LEARNING OBJECTIVES

- Use a systematic approach to interpretation, regardless of the imaging study
- Organize your information
- Use a modified Roentgen sign approach to describe lesions as you encounter them

## MULTIPLE CHOICE QUESTIONS

1. What would a complete list of Roentgen signs modified for CT interpretation include?
  - (A) Size, shape, number, opacity, location, margination

- (B) Size, shape, number, attenuation, location, enhancement
- (C) Size, shape, number, attenuation, margination, delineation
- (D) Size, shape, number, attenuation, location, margination

2. How many sections is it helpful to divide the thorax and abdomen into for interpretation of CT studies?

- (A) 2
- (B) 3
- (C) 4
- (D) 5

3. In modern CT, what happens to contrast resolution and spatial resolution compared to radiography?

- (A) Contrast resolution increased, spatial resolution decreased
- (B) Contrast resolution decreased, spatial resolution increased
- (C) Contrast resolution decreased, spatial resolution decreased
- (D) None of the above

# Breathe in: thoracic CT

Chris Warren-Smith

Computed tomography (CT) is now considered the gold standard for imaging of the thorax where it provides superior image quality for imaging the lung, body wall, vasculature and skeletal structures of the thorax due to the lack of superimposition compared to two-dimensional radiography. CT can be used to better characterize lung changes to help differentiate between inflammatory, infectious and neoplastic diseases. CT is also superior to radiography for the identification of pulmonary metastases, where it can detect nodules as small as 2 mm in diameter (vs. 5 mm for radiography). CT is also useful for assessment of mediastinal lesions where it can assess any masses or lesions present, including their relationship to other structures in the mediastinum in particular their vascular supplies. CT also allows biopsy or fine-needle aspiration (FNA) of lesions that may be inaccessible to ultrasound.

## PROTOCOL FOR THE THORAX

- 120 kV, 100+ mAs, 1.5-mm detector with 3-mm slice reconstructions (smaller reconstructions can be considered for high definition)
- A lung window is required to review lung images with a soft tissue window for the soft tissue structures
- Additional bone reconstructions can be considered if the skeletal structures are of specific interest

## PROCEDURE

Thoracic CT can be performed under sedation or under general anaesthesia (GA) especially with modern multi-slice scanners, however atelectasis may become apparent. Atelectasis should occur in the dependent aspect of the lung (typically ventral if the scan is performed in sternal recumbency). Minimizing the time between sedation/GA induction and scanning will reduce this but if under GA then manual ventilation of the lung to reduce atelectasis may be necessary. Contrast is generally not useful for assessment of the lung (inflammatory and atelectic lung share the same appearance) however it is particularly useful for assessing the vasculature and soft tissues of the thoracic wall. It also helps to identify pleural lining which may be useful in pleural effusion cases.

## ASSESSMENT

Assessment of the thorax should include assessment of the trachea and the bronchi for evidence of collapse or change within the structures. It should be possible to follow each main bronchus to allow identification of each lung lobe. The lung should then be assessed with the same lung patterns used for thoracic radiographs. CT is more sensitive than radiography so more subtle lesions may become apparent. Following assessment of the lung then the pleural lining, vascular and skeletal structures and finally the muscles of the thoracic wall including the diaphragm may be assessed. It should be noted however that CT is generally not used as a first-line modality for cardiac disease although it may be used to assess cardiac structure with contrast.

This lecture will concentrate on some of the disease processes seen in the thorax.

**KEY LEARNING OBJECTIVES**

- Computed tomography (CT) is the gold standard for thoracic imaging
- Atelectasis should be minimized to avoid artefacts on images
- Contrast is not indicated when assessing lung

**MULTIPLE CHOICE QUESTIONS**

1. What size of metastatic nodules may be detected on radiography?
 

(A) 2 mm	(C) 4 mm
(B) 3 mm	(D) 5 mm

2. What size of metastatic nodules may be detected on CT?
 

(A) 2 mm
(B) 3 mm
(C) 4 mm
(D) 5 mm
3. What is the 'classic' appearance of *Angiostrongylus* on CT?
 

(A) Generalized interstitial pattern
(B) Generalized alveolar pattern
(C) Peripheral alveolar pattern
(D) Bronchial thickening

# Around the abdomen: indications for abdominal CT

**Matthew Winter**

**INTRODUCTION**

Radiography and ultrasonography have been the routine screening tests of choice for decades in veterinary medicine, and in many practices constitute a portion of the minimum database for more complex work-ups. However, computed tomography (CT) is being used more frequently for the evaluation of veterinary patients with abdominal disease. Applications range from characterization of masses and staging neoplastic disease to evaluation of patients that present with acute abdominal signs.

**STAGING DISEASE**

As discussed in a prior session, CT has been used with increasing frequency to assess patients for neoplastic metastases including the detection of nodules, osseous lesions, generalized organomegaly, and lymphadenopathy. The characterization of masses through evaluation of size and distribution, as well as attenuation and enhancement characteristics, provides critical information regarding prognosis and response to therapy.

Characterization of masses is also useful for surgical planning, and for identifying involvement of nearby structures and/or vascular invasion. CT assessment of splenic masses has been reported with some features aiding in distinguishing between benign and malignant splenic masses. In the case of adrenal masses, specific imaging features have been described that allow for accurate characterization of masses as benign or malignant, and may potentially allow for the distinction between pheochromocytoma and adenocarcinoma.

**ACUTE ABDOMEN**

More recently, the utility of CT for the evaluation of patients with suspected intestinal obstruction has been

described. Specifically, the accuracy of CT was compared to that of radiography and ultrasonography. The accuracy of CT was found to be slightly better than that of ultrasonography, especially when the operator dependence of ultrasonography is factored in. In addition, CT is rapid, and can typically be performed with sedation. For the evaluation of gastrointestinal obstruction, contrast was not necessary, but will likely provide additional information depending on the ultimate diagnosis (i.e. luminal foreign body vs. intestinal mass/neoplasia).

Pancreatitis cases can also be imaged via CT. Complete sonographic evaluation of the pancreas is often not possible due to the presence of gas in intestinal segments or hyperattenuating fat. CT is not limited by these factors, and can often provide a complete assessment of the pancreatic parenchyma and regional lymph nodes. CT has also proven valuable in the identification of pancreatic neoplasms, including insulinomas.

**GENITOURINARY TRACT**

CT, as well as other techniques of more direct visualization, has supplanted the excretory urogram for evaluation of the urinary tract. CT excretory urography can be critical to evaluating renal function, ureteral patency, ureteral course and the trigone in cases of urinary incontinence, stranguria or dysuria. While these studies can be technically demanding, they can reveal much about abnormalities in urinary tract anatomy and pathophysiology.

**VASCULAR LESIONS**

Perhaps one of the most common applications of CT in the abdomen is for the evaluation and characterization of portosystemic vascular anomalies using CT angiography. Since the early 2000s there have been many researchers that have described the CT imaging features of portosystemic shunts, arteriovenous fistulas and other vascular malformations. Properly acquired studies obtained during the different phases of enhancement (arterial, portal and venous) can yield images with detailed vascular anatomy. This information is often used for surgical planning or for planning other interventional procedures.

CONCLUSION

While there are many uses for CT in the abdomen, the studies listed above and extrapolations thereof constitute the majority of our abdominal CT caseload. These are key questions that can be answered with a properly planned and executed CT examination.

KEY LEARNING OBJECTIVES

- Computed tomography (CT) is excellent for the evaluation of the acute abdomen
- Portosystemic shunts can be accurately detected and characterized using CT angiography
- CT is critical for characterization of masses, surgical planning and staging neoplastic disease

MULTIPLE CHOICE QUESTIONS

1. What can CT be used to distinguish accurately?
- (A) Adrenal adenomas from adrenal adenocarcinomas

- (B) Pancreatic adenocarcinoma from pancreatitis
- (C) Hepatocellular carcinoma from hepatoma
- (D) Intestinal adenocarcinoma from lymphoma
2. Which of the following is true as it pertains to the accuracy of CT in the diagnosis of gastrointestinal obstruction?
- (A) CT is not as good as ultrasonography
- (B) CT is not as good as radiography
- (C) CT is better than ultrasonography
- (D) CT is operator dependent
3. Accurate characterization of portosystemic vascular anomalies requires assessment of how many vascular phases? Which are they?
- (A) 3: arterial, capillary, venous
- (B) 2: arterial and venous
- (C) 1: venous
- (D) 3: arterial, portal, venous

A headache or a pain in the neck? Head and neck CT

Chris Warren-Smith

Computed tomography (CT) eliminates superimposition and within the head this allows far superior evaluation of the nasal chambers, frontal sinuses and the soft tissues of the head compared to conventional radiography. CT may also be used to evaluate the cranial vault although it is worth noting that magnetic resonance imaging (MRI) remains superior to CT for evaluating the brain. CT can be considered for assessment of nasal disease for differentiating neoplasia from infectious and inflammatory disease, diseases of the larynx, salivary glands and lymph nodes and for assessment of dental changes.

For scanning the head, a bone and soft tissue reconstruction should be performed with slice thickness of 2 mm for soft tissue and a thickness of 1.5 mm or less for the bone reconstruction (Figure 1). Generally, pre- and post-contrast images are advised, with only soft tissue

reconstructions required post contrast. When scanning the brain, noise should be minimized by using thicker reconstructions, typically 3 mm (small dogs and cats) to 5 mm in larger patients. Sequential rather than helical scanning may also result in better images for the brain, although helical scanning is preferred for all other structures.

CT of the spine is particularly useful in patients with trauma, where the speed of CT and the bone detail is ideal for fracture detection while being able to keep the patient immobilized. This is particularly true for the neck. Other conditions where CT can be useful include atlanto-axial subluxation, discospondylitis and some mineralized discs. CT is also useful for assessment of the thyroid glands, lymph nodes and muscles of the neck and also for stick injuries and tracking foreign bodies.

KEY LEARNING OBJECTIVES

- Computed tomography (CT) is superior to radiography due to the lack of superimposition, thus improving sensitivity and specificity for lesions particularly in the nasal cavity
- Magnetic resonance imaging (MRI) remains superior to CT for assessing the brain
- Contrast administration must be performed for any soft tissue disease assessment in the head and neck

Area	kV	mAs	Rotation time	Pitch	Detector size	Reconstruction
Head (general)	130	220	1.5 s	0.8	0.6 mm	1.5 mm bone, 2 mm soft tissue
Brain sequence	130	270	1.5 s	7.2 mm	0.6 mm	3 mm
Neck (soft tissue)	130	130	1.0 s	0.8	1.2 mm	2–3 mm

Figure 1: Protocol suggestions for the head and neck

## MULTIPLE CHOICE QUESTIONS

- When performing a CT scan for assessment of the brain which setting modification is correct?
  - Decrease mAs
  - Decrease kV
  - Increase slice thickness
  - Increase table movement speed
- Which of the following features is specific to *Aspergillus*?
  - Turbinate loss
  - Sinus fluid
  - Nasal septum loss
  - Bone hyperostosis
- What is the sensitivity of CT for wooden foreign bodies?
  - 59%
  - 69%
  - 79%
  - 89%

# Give the dog a bone: orthopaedic CT

Chris Warren-Smith

Computed tomography (CT) offers very fine detail which makes it an ideal modality for orthopaedic imaging. CT should be used for assessment of the skeletal structures but it remains useful for soft tissue imaging where it can detect subtle mineralization and swelling. However, magnetic resonance imaging (MRI) remains the gold standard for muscular imaging and, in particular, for evaluation of synovial changes and ligaments. Ultrasonography may also be considered. It is also worth noting that CT is a useful adjunct to, rather than a replacement for, conventional radiography and is not appropriate in all situations.

As part of the assessment of skeletal structures, multiplanar reconstructions should be used particularly when assessing joints, as subtle lesions may only become apparent when viewed from different angles (for example, osteochondrosis dissecans (OCD) in the elbow joint). Ideally these should be reconstructed from the original raw data on the CT reconstructor itself, as this will give the best image detail when isotropic voxels are used in the original scan protocol. Scanning protocols should therefore be with the thinnest possible

slices, with an overlapping reconstruction (Figure 1). However, the trade-off is that a large number of images are generated and there is excess stress on the tube head so this should be tempered against the length of the scan range. It is also worth considering the potential long-term effects of radiation, as typically these patients may be young, especially those with developmental disease.

It is important to keep the field of view as small as possible to optimize image detail. Contrast administration should only be used when soft tissues are being assessed.

The other advantage of multiplanar reconstruction is for assessment of limb deformities such as femoral varus or angular limb where it allows assessment and measurement of the degree of deformity. Three-dimensional (3D) models may also be generated from the CT data using surface rendering from viewing software, to allow 3D printing to be performed (note these are typically exported as .stl files). Slices should be less than or equal to 1 mm for 3D printing.

## KEY LEARNING OBJECTIVES

- For best assessment of bone slices of 1 mm or less should be acquired
- Evaluation of joints should involve examination in multiple planes using post-scanning reconstruction
- Field of view should be minimized at all times for the best spatial resolution

Area	kV	mAs	Rotation time	Pitch	Detector size	Reconstruction
Joints	130	80	1.5 s	0.75	0.6 mm	1 mm for soft tissue <1 mm for bone
Large range scanning (e.g. angular limb)	130	190	0.6 s	0.85	0.6 mm	2 mm bone and soft tissue for general viewing <1 mm for 3D reconstruction

Figure 1: Protocols for orthopaedic CT

## MULTIPLE CHOICE QUESTIONS

1. Contrast administration would be indicated for which of the following conditions?  
(A) OCD  
(B) Panosteitis  
(C) Neoplasia  
(D) Fractures
2. CT would NOT be indicated for which of these conditions?

- (A) Elbow dysplasia  
(B) Gastrocnemius contraction  
(C) Angular limb deformity  
(D) Hip dysplasia
3. What slice thickness is most appropriate for 3D model printing?  
(A) 0.75 mm  
(B) 1.5 mm  
(C) 3 mm  
(D) 5 mm

## Could I, should I, would I? When can I use spinal CT?

**Matthew Winter**

### INTRODUCTION

The utility of computed tomography (CT) for evaluation of the spine is fraught with challenges, however CT remains an excellent test when applied in appropriate circumstances to appropriately chosen patients. Most of the controversy stems from the accuracy of CT relative to CT myelography and magnetic resonance imaging (MRI) applied in cases of thoracolumbar myelopathy. To be sure, these tests are often chosen for different reasons and have different availability.

For example, radiography and myelography have been the mainstay for evaluation of intervertebral disc disease and spinal cord compression in veterinary patients for decades. CT and CT myelography enabled better visualization of the spinal cord and subarachnoid space as well as the surrounding components of the canal. Still, CT does not provide the level of contrast resolution that is available with MRI, and therefore evaluation of the spinal cord parenchyma can be less accurate. In addition, MRI may be less available in your area. Also, many veterinarians are not skilled in myelographic techniques. Technical errors and complications during intrathecal injection can result in a non-diagnostic study.

### THORACOLUMBAR MYELOPATHY

For chondrodystrophic breeds, CT alone can provide accurate information regarding the location and severity of a bulging, protruding or extruded mineralized disc. Some authors describe an increase in sensitivity and specificity with the addition of intravenous contrast, and clearly the addition of myelography can often help identify the most compressive lesions. It can be challenging to sort out the clinical significance of extradural compressive lesions when more than one is present, and separating chronic from acute protrusions can also be difficult. In these cases, it may be necessary to add additional testing, either with CT myelography or MRI.

### CERVICAL SPONDYLOMYELOPATHY

The utility of CT for the diagnosis and characterization of the multiple forms of cervical spondylomyelopathy has been well documented. CT provides excellent information regarding morphology of the vertebrae, the vertebral canal, the articular facet joints and vertebral alignment. Characterization of degenerative changes, vertebral canal narrowing and subluxation can be done quickly and easily with CT. As mentioned above, changes in spinal cord integrity are not easily assessed with CT, and the addition of MRI to the diagnostic imaging arsenal may be necessary for complete assessment.

### TRAUMA

Traumatic injury to the vertebral canal can be assessed quickly and easily with CT. A CT examination can reveal fractures, subluxations and luxations that may result in spinal cord trauma. Although the integrity of the spinal cord cannot be directly assessed, indirect information regarding changes in vertebral canal diameter, alterations in intervertebral foramen diameter, and indirect assessment of the soft tissue/ligamentous structures responsible for stabilization (as in atlantoaxial subluxation) can be performed. A common use of CT is to evaluate trauma patients quickly to determine the severity and location of fractures that may affect the axial skeleton and the central nervous system.

### DISCOSPONDYLITIS

The imaging findings associated with discospondylitis have been well described, although few reports describe the widespread use of CT for the diagnostic evaluation of discospondylitis. This is likely to be due to the fact that this lesion is readily diagnosed via radiography and advanced imaging is often unnecessary. While the sensitivity and specificity of CT in the diagnosis of discospondylitis has not been reported, CT provides an accurate assessment of aggressive osseous changes that accompany this disease process.

### NEOPLASIA, INFECTION, INFLAMMATION

In older patients in which the potential for neoplastic spinal cord diseases may be greater, CT may not provide enough information. Contrast enhancing lesions may be detected on post-contrast studies, and aggressive lesions



involving the osseous structures of the vertebral column may also be well described by CT. In cases that involve infection other than discospondylitis, inflammation such as meningoencephalomyelitis of unknown origin, or vascular insult such as fibrocartilaginous embolic myelopathy, CT is much less useful.

## CONCLUSION

The success of CT in evaluation of spinal disease is completely dependent on case selection. The decision to use CT should be made based on the patient's signalment, history and clinical signs, which will significantly influence the value and utility of the examination and will help you and your clients manage expectations with regard to imaging results.

## KEY LEARNING OBJECTIVES

- The utility of computed tomography (CT) in evaluating cases of thoracolumbar myelopathy is careful patient selection
- CT is an excellent test for chondrodystrophic breeds with signs of acute myelopathy
- CT, contrast CT and CT myelography are excellent tests for many cases of thoracolumbar myelopathy,

but may not provide information regarding the integrity of the spinal cord

## MULTIPLE CHOICE QUESTIONS

1. Which of the following CANNOT be assessed well using CT?
  - (A) The vertebrae
  - (B) The intervertebral disc spaces
  - (C) The spinal cord
  - (D) The articular facet joints
2. Which of the following diseases CANNOT be diagnosed with CT?
  - (A) Mineralized intervertebral disc extrusion
  - (B) Meningoencephalomyelitis of unknown origin
  - (C) Discospondylitis
  - (D) Cervical spondylomyelopathy
3. Why is CT myelography performed less frequently than contrast-enhanced CT?
  - (A) It isn't very useful
  - (B) It isn't necessary
  - (C) It can be technically challenging
  - (D) It is often contraindicated



## Section III

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# Veterinary streams

Saturday 6 April

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Saturday 6 April  
Hall 3

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# Fantastic foreign bodies and how to find them!

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- 100 08:30–09:15  
**Tracking foreign bodies: a review of imaging techniques**  
Francisco Llabrés Díaz
- 101 09:25–10:10  
**Foreign bodies of the head**  
Jonathan Bray
- 102 11:05–11:50  
**Endoscopic management of foreign bodies**  
David Walker
- 103 12:00–12:45  
**'For the chop': surgical management of thoracic and abdominal foreign bodies**  
Georga Karbe
- 104 14:05–14:50  
**Needle in a haystack: dealing with tracking foreign bodies**  
Georga Karbe
- 104 15:00–15:45  
**The recurrent foreign body: what to do next?**  
Jonathan Bray

# Fantastic foreign bodies and how to find them!

## Tracking foreign bodies: a review of imaging techniques

**Francisco Lladrés Díaz**

The main question is which imaging modality to use and, if several modalities are to be used, in which order. Four main scenarios are regularly seen.

### GRASS SEEDS AND OTHER TRACKING FOREIGN BODIES

If the clinical signs are recent and the location of the suspected foreign body is superficial, ultrasonography can be used to diagnose the foreign body and to attempt retrieval. The presence of a hypoechoic/anechoic surrounding abscess and/or discharge sinus will aid the identification. Use forceps (haemostatic, crocodile or endoscopic) for retrieval.

Foreign bodies causing retroperitoneal/sublumbar infection will mostly benefit from the use of advanced imaging, particularly if chronic. Computed tomography (CT) allows the assessment of the lung fields in case the foreign body travelled through the bronchial tree. Magnetic resonance imaging (MRI) may make the evaluation of the extension of the infection easier (iliopsoas musculature, vertebral column and vertebral canal).

### PENETRATING INJURIES

These occur particularly as oral, oropharyngeal and thoracic inlet injuries. In this scenario, CT tends to be recommended. Although radiography can detect air within the soft tissues, CT will offer more detailed evaluation of the original injury and extension of any associated changes, helpful for surgical planning/retrieval.

### OESOPHAGEAL FOREIGN BODIES

Radiography is the preferred modality in this situation. The oesophagus sits very much at midline, and therefore it would be expected to be very central on a dorsoventral projection.

### GASTROINTESTINAL FOREIGN BODIES

The author prefers ultrasonography over radiography in this situation. Ultrasonography allows not only the detection of dilated intestinal loops but also evaluates the intestinal contents and the appearance of the wall (reaction or ulceration).

When ultrasonography is not available, and with more widespread access to teleradiology, other modalities are being regularly used. Pneumocolonography can be used to ascertain whether a dilated intestinal loop corresponds to colon or small intestine. The latter would support a mechanical obstruction.

It is the unusual and convincing relative focal dilation of small intestinal loop(s) when compared to the remaining loops (dual population radiographic pattern) which should raise suspicion for mechanical obstruction rather than a particular radiographic measurement.

### KEY LEARNING OBJECTIVES

- Advanced imaging is likely to be useful in most situations. Judicious use of radiography and ultrasonography, however, can be practical and financially viable
- Factors to consider when choosing an imaging technique: financial considerations; chronicity; swift access to the technique and expertise on image interpretation
- Macerated or small remnants of a foreign body will be difficult to detect irrespective of the chosen technique

### MULTIPLE CHOICE QUESTIONS

1. What is the typical appearance of a grass seed on ultrasonography?
  - (A) An echogenic continuous linear structure
  - (B) An interrupted anechoic curved structure
  - (C) A fusiform echogenic structure
  - (D) Grass seeds are not visible on ultrasonography
2. Which statement about evaluation of a radiograph in a case of a large oesophageal foreign body is TRUE?
  - (A) It is limited to diagnosing the foreign body
  - (B) It is not a good choice of technique
  - (C) Can only help if the foreign body is surrounded by oesophageal gas
  - (D) Can diagnose aspiration pneumonia/mediastinitis
3. Which of these results for the width of a distended loop would support an intestinal obstruction on radiography?
  - (A) Greater than 0.5 the diameter of the aorta in cats
  - (B) Greater than proximal femur width in cats
  - (C) Greater than 1.2 times the height of L2 vertebral body in dogs
  - (D) Greater than 1.6 times the height of L5 in dogs

# Foreign bodies of the head

Jonathan Bray

## NASAL FOREIGN BODIES

The nose has a limited repertoire of clinical signs, and many nasal diseases present with an identical clinical picture making differentiation on clinical examination alone difficult. *Reverse sneezing* is an important condition to recognize. Reverse sneezing is caused by spasms of the nasopharynx and is typified by violent, paroxysmal inspiratory effort. Reverse sneezing accurately localizes the site of irritation to the nasopharynx and diagnostic investigation should therefore focus more specifically on this region. Many foreign bodies lodge in the nasopharynx, after being regurgitated or coughed up following inadvertent ingestion/inhalation.

Definitive analysis of nasal disease is best achieved with a combination of computed tomography (CT) and nasal endoscopy. Most foreign bodies can be removed via either of the nostrils, or from behind the soft palate, but the first challenge is to achieve a good visualization of the offending item.

## RETROBULBAR FOREIGN BODIES

Foreign bodies may enter the orbit through the conjunctiva or the roof of the mouth. Grass awns are commonly implicated, but sharp pieces of bone or wood are also possible causes. Sometimes, infection is introduced as a penetrating injury only, and no residual foreign material is present.

Dogs with orbital foreign bodies may present with some degree of exophthalmos, protrusion of the third eyelid, and severe pain on opening of the mouth. Pyrexia and systemic malaise may be present. Possible differentials include neoplasia, tooth root abscessation or trauma. Investigations will include imaging, and either ultrasound or CT will enable evaluation of the area.

If an abscess is diagnosed, drainage and antibiotic therapy are indicated. To establish drainage, make an incision with a blunt haemostat into the mucous membrane over the swollen area behind the fourth premolar tooth. The wound should be left open to allow for further drainage.

If a foreign object is identified, surgical exploration of the orbit may be required. CT images will assist with planning. In most instances, adequate exposure can be achieved by a combined dorsal and lateral approach, with access improved with removal of the zygomatic arch.

## PHARYNGEAL STICK INJURIES

Penetrating injury of the oropharynx is most commonly due to impact from a stick. While oral injuries can occur to a dog when carrying or chewing sticks, more severe injuries are seen when the stick is thrown by the owner. In these cases, the dog may run onto the stick at speed,

or there may be a violent tussle between two dogs. This more severe impact can cause extensive penetrative trauma to the tongue, pharynx and oesophagus. Fragments of wood or large pieces of stick may break off and become embedded, and the tissue planes of the neck and mediastinum can become heavily contaminated with organic debris and bacteria.

Although stick injuries are often observed by the owner, the full extent of injury may not always be appreciated. In these cases, life-threatening sepsis can develop within a few days. If the original contamination was not overwhelming, a more chronic draining sinus may develop.

If a stick injury is suspected, it is important to thoroughly inspect the sublingual region, caudal oropharynx, soft palate and hard palate. Lesions may not be penetrating. Cervical and thoracic radiography is useful to look for the presence of free gas within the cervical tissue planes. It is unlikely that a foreign body will be identified, unless outlined by gas.

If a penetrating oropharyngeal lesion is identified and/or gas is observed within the cervical tissue planes then prompt ventral midline cervical exploration is essential.

## KEY LEARNING OBJECTIVES

- Recognize the clinical signs that may suggest foreign body penetration of the nasal, oral or pharyngeal tissues
- Understand the importance of coaxial imaging, and other imaging modalities, to assist with diagnosis and localization of the foreign body
- Recognize the variety of presentations for pharyngeal stick injuries, and the potential for life-threatening sepsis to develop

## MULTIPLE CHOICE QUESTIONS

1. Why is reverse sneezing an important clinical sign to recognize?
  - (A) It is characteristic for a blade of grass being stuck in the nose
  - (B) It helps localize the site of irritation to the nasopharynx
  - (C) Clients find it very distressing
  - (D) It is potentially life-threatening for the dog
2. Which of the following statements about retrobulbar abscesses is INCORRECT?
  - (A) They may be caused by penetrating wounds from the oral cavity or the conjunctiva
  - (B) They are always associated with residual foreign material that needs to be removed
  - (C) Tumour extension from the nasal cavity may require a CT scan to diagnose with confidence
  - (D) Severe haemorrhage may occur if blind probing of the retro-orbital cavity from the oral cavity is performed with sharp implements



# Fantastic foreign bodies and how to find them!

3. Why can stick injuries to the oral cavity be life-threatening?
- (A) The dog is unable to eat properly due to local swelling
  - (B) There is a risk of laryngeal obstruction due to oedema

- (C) Bacterial contamination of the cervical tissues can lead to sepsis and mediastinitis
- (D) Treatment is often expensive so the owners may elect euthanasia

## Endoscopic management of foreign bodies

David Walker

Endoscopic foreign body removal in dogs and cats primarily involves removal of objects from the oesophagus, stomach, nose, nasopharynx and the larger airways. Some objects are relatively simple to remove with the correct equipment, whilst others prove to be a significant challenge.

Oesophageal foreign bodies are usually bones and they typically lodge at the thoracic inlet, heart base or hiatus. They are considered to be an emergency and should be removed as soon as the patient is stable to reduce the risk of perforation. They can be removed with the help of endoscopy or fluoroscopy, although the author prefers the former. Endoscopy has the advantage that the oesophageal mucosa can be assessed for damage. Large, rigid grasping forceps are passed alongside the endoscope and the foreign body is firmly grasped; care must be taken not to grasp the oesophageal wall. The foreign body is gently manipulated and if movement is evident it is withdrawn. If a bone foreign body has to be manipulated into the stomach, it will be rapidly digested and gastrotomy is not required. It is important to remember that the aboral side of the foreign body may be sharp and could damage the mucosa. Oesophagotomy is very rarely required. The major complications associated with oesophageal foreign body removal are perforation and stricture formation secondary to oesophagitis.

Oesophageal fish hooks sometimes present a challenge. It is always worth checking under the tongue for fishing line and it is useful not to cut the line as it is sometimes helpful during manipulation. Fish hooks normally need to be pushed aborally to disengage them from the oesophageal wall. A small hole is left but there are rarely any complications. The point of the hook needs to be facing aborally for removal.

Many gastric foreign bodies can be removed endoscopically avoiding the morbidity associated with gastrotomy. Various instruments are available for use through the working channel of the endoscope.

The most common airway foreign objects in the author's practice are large ears of wheat and grass awns. These foreign bodies tend to cause acute or chronic coughing and may cause only minor or no radiographic change. Stones, teeth and food are other reported airway foreign bodies. Different retrieval forceps can be used through the working channel of the endoscope depending on the type of foreign body.

### KEY LEARNING OBJECTIVES

- Have an understanding of the range of instruments available for foreign body removal
- Have an understanding of the risks and complications associated with foreign body removal related to the site of the object
- Be able to make appropriate decisions with regards to which cases can be managed within your practice

### MULTIPLE CHOICE QUESTIONS

1. Which of the following breeds are over-represented with regards to oesophageal and/or gastric foreign bodies?
  - (A) Affenpinscher and German Wirehaired Pointers
  - (B) Afghan Hounds and Shetland Sheepdogs
  - (C) Labrador Retrievers and Australian Cattle Dogs
  - (D) West Highland White Terriers and Bernese Mountain Dogs
2. Although, relatively uncommon, what is the major complication seen following oesophageal foreign body removal?
  - (A) Peri-oesophageal abscessation
  - (B) Oesophageal perforation
  - (C) Oesophageal stricture
  - (D) Respiratory arrest
3. Which of the following would be the most appropriate endoscopic instrument with which to remove a stone gastric foreign body?
  - (A) Alligator jaw forceps
  - (B) Four wire basket forceps
  - (C) Rat tooth forceps
  - (D) Snare (30 mm)

# 'For the chop': surgical management of thoracic and abdominal foreign bodies

**Georga Karbe**

Foreign bodies (FB) found in the thoracic or abdominal cavities can be inhaled, ingested or penetrate from externally. Ingested FB can lead to obstruction, organ tissue necrosis and perforation. Perforation of the oesophagus or gastrointestinal tract can result in generalized infection of the thoracic (pyothorax) or abdominal cavity (peritonitis). Inhaled foreign material may result in abscess formation within the pulmonary parenchyma or pleural space. This presentation will review preoperative assessment, emergency stabilization, surgical treatment and postoperative management using case examples.

## THORACIC FOREIGN BODIES

Inhaled grass seeds or other foreign material can become lodged within the lower airways where they present a nidus for infection. Patients will present with an acute or chronic cough and/or generalized malaise. Often a single consolidated lung region can be seen on thoracic imaging. Purulent material may be seen within the affected bronchus on bronchoscopy.

Endoscopic retrieval of bronchial FB may be possible unless the material has become lodged in the smaller, peripheral airways. Surgical removal of the affected lung region is often indicated. Ruptured pulmonary abscesses or extrapulmonary pleural abscesses require surgical treatment either via median sternotomy, lateral thoracotomy or thoracoscopy.

In some instances, thoracic foreign bodies can migrate through the diaphragm into the abdomen or retroperitoneal space. Conversely, ingested foreign bodies can penetrate from the abdomen through the diaphragm into the thorax.

Intrathoracic oesophageal FB that cannot be retrieved via endoscopy will require surgical intervention. Oesophageal surgery carries a high risk of postoperative complications and patients must receive water and food via a gastrostomy tube exclusively while the oesophagus heals for a minimum of 10–14 days. Following thoracic exploration, a chest drain(s) is placed so that postoperative fluid and air production can be monitored. Broad-spectrum antimicrobial therapy is administered and adjusted based on culture results. Supportive care with intravenous fluids and analgesia is continued based on the status of the patient.

## ABDOMINAL FOREIGN BODIES

Patients with ingested abdominal FB often present with an acute onset of vomiting, anorexia and lethargy. On physical examination, abdominal pain and evidence of

dehydration are commonly found. Abdominal imaging and routine blood screening are necessary to diagnose and stabilize the patient prior to surgical intervention. Gastric FB can often be removed via endoscopy, whereas surgical intervention is required when material has moved out of the stomach and/or when organ perforation is suspected. The entire abdominal cavity and organs must be thoroughly evaluated via a standard ventral midline laparotomy. Gastrotomy, enterotomy and/or enterectomy may be required to remove obstructive FB and remove necrotic intestinal segments. Once material has passed into the colon, surgical intervention is not generally recommended.

Postoperatively, patients are offered food by mouth as soon as they have fully recovered from anaesthesia, early (within 24 hours) enteral nutrition is known to improve patient outcome. Supportive care is continued based on the status of the patient. The use of antimicrobials is indicated in patients with peritonitis, however not all patients undergoing gastrointestinal surgery require postoperative antimicrobials.

## KEY LEARNING OBJECTIVES

- Identifying foreign bodies in the abdomen and thorax
- Surgical treatment for foreign body removal
- Postoperative management

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is NOT a recommended treatment option for patients with thoracic foreign bodies?
  - (A) Endoscopy
  - (B) Thoracoscopy
  - (C) Thoracic explore via median sternotomy
  - (D) No intervention needed, medical management only
2. Which of the following is TRUE regarding oesophageal surgery?
  - (A) Patients should be fed by mouth within the first 24 hours after surgery
  - (B) The oesophagus heals quickly and generally without complications
  - (C) Patients must receive water and food exclusively via gastrostomy tube
  - (D) Patients must receive food exclusively via gastrostomy tube, water can be offered by mouth
3. Which of the following is FALSE regarding gastrointestinal surgery?
  - (A) Postoperative antibiotics are recommended in all patients following gastrointestinal surgery
  - (B) Foreign bodies in the colon do not generally require surgery
  - (C) Postoperatively patients should be offered enteral nutrition within the first 24 hours
  - (D) Foreign bodies in the stomach can be retrieved via endoscopy

# Fantastic foreign bodies and how to find them!

## Needle in a haystack: dealing with tracking foreign bodies

Georga Karbe

Foreign bodies (FB) such as grass awns, grass seeds and sticks are known to enter the body most commonly through small wounds in the extremities or the oropharynx. Foreign bodies will frequently migrate away from the point of entry, resulting in swelling, pain and chronic draining tracts either near or distant to the entry site. Clinical signs often improve with antimicrobial therapy, but recur once treatment has been discontinued. This presentation will discuss diagnostics, surgical management and common pitfalls when treating migrating foreign bodies.

Patient signalment, history as well as temporary response to antimicrobial treatment may often arouse suspicion for migrating FB. Commonly, owners report coughing, gagging or ptyalism after their dog was seen playing with a stick or note lameness or excessive licking of a paw or other body part. Foreign bodies have been reported to track into the sublumbar musculature and the flank as well as into the pericardium or spine. Imaging such as ultrasonography, computed tomography (CT) or magnetic resonance imaging (MRI) scans are helpful in locating the FB and for surgical planning. If present, draining tracts can be probed, however this is often insufficient, and a wide surgical exploration and debridement are required. It is not uncommon for the foreign material not to be found on surgical exploration. This may in part be due to the body's natural response of abscess formation and phagocytosis of these materials, making the FB unidentifiable. Wide surgical debridement of all infected tissues is therefore recommended, as it can be assumed that these tissues contain the FB. The removed tissues are submitted for culture and histopathology and treatment is adjusted based on these results.

Recurrence is the most common complication following FB removal/exploratory surgery. Recurrence can be seen within a few weeks or months after surgical treatment. Patients will present with similar signs although the swelling or draining tract may have moved away from the surgical area. Repeat imaging and exploration are recommended. Multiple surgeries may be required in some patients.

### KEY LEARNING OBJECTIVES

- Possible behaviour of migrating foreign bodies
- Surgical planning and treatment
- Dealing with postoperative recurrence

### MULTIPLE CHOICE QUESTIONS

1. How will patients with migrating foreign bodies commonly respond to antibiotic therapy?
  - (A) Clinical signs are unchanged
  - (B) Clinical signs worsen initially and then resolve once treatment is discontinued
  - (C) Clinical signs improve initially then recur once treatment is discontinued
  - (D) Patients with foreign bodies should not be treated with antibiotics
2. What reaction do foreign bodies cause in the body?
  - (A) Autoimmune reaction
  - (B) Allergic reaction
  - (C) Abscess formation
  - (D) Neurogenic reaction
3. What is the most common complication following migrating foreign body surgery?
  - (A) Recurrence
  - (B) Pancreatitis
  - (C) Bleeding
  - (D) Pneumothorax

## The recurrent foreign body: what to do next?

Jonathan Bray

Prior to the turn of this century, dogs with a draining sinus would likely undergo a mean of 2.0 surgical procedures (range, 1 to 5) before definitive resolution was achieved. In some animals, their disease was never successfully resolved and euthanasia was considered.

If you have got this far through this lecture series on foreign body management, you will by now understand the importance of coaxial imaging and elimination of the nidus of infection to achieve complete resolution of the

draining sinus. Therefore, if we assume that good first principles have been followed, and the original nidus of disease has been completely eliminated, the incidence of persistently draining sinuses is now uncommon.

The incidence of the truly recurrent (i.e. a *de novo*) foreign body is undocumented, but is likely to be extremely low, and may be difficult to prove. With migrating grass seeds being a relatively sporadic and random occurrence, environmental and lifestyle circumstances are likely to play a role.

Some dogs are prone to serial ingestion of inorganic (e.g. toys, plastic wraps, sock etc.) or organic (e.g. bones, corn cobs, etc.) material that may be a cause for intestinal obstruction, and repeated exploratory laparotomy/enterotomy. Such pica is largely considered to be a behavioural problem and needs to be addressed as such. There do not appear to be any medical reasons to explain

this behaviour, which is more common in the younger animal.

There are, however, several conditions where recurrence of a foreign body could be considered a possibility, due to the persistence or development of similar clinical signs.

## ADHESIONS

There are a few published case reports and some anecdotal examples of cases where adhesions from previous intestinal surgery has led to episodes of partial or complete obstruction of the bowel.

## INTERDIGITAL FURUNCULOSIS (INTERDIGITAL CYST)

Interdigital cysts can develop in many different breeds, but the Bulldog breed seems particularly susceptible. Interdigital cysts are rarely 'cystic', and are more typically a pyogranulomatous inflammation. The lesion will develop as an inflamed, nodular and irritable lesion on the interdigital webbing. There may be discharge and apparent sinus in the middle of the lesion, which may raise the suspicion for a foreign body.

The aetiology of the interdigital cyst is not entirely understood, and a variety of treatments have been proposed to manage them.

## DERMOID SINUS

Dermoid sinuses are located directly on the midline, and have been reported on the nose, neck and spine. Dermoid sinuses are caused by incomplete separation of the skin and the nervous system during embryonic development; the tube is lined with epithelium and hair may also develop.

The depth of the defect varies, and the dermoid sinus may extend into the tissue just beneath the skin or extend deeper and terminate anywhere along the midline tissue planes (usually distinct fascial layers). They can even extend to the dura mater of the spinal cord in extreme cases. In other cases, the dermoid sinus may be a blind-ended sac beneath the skin; in these situations, deeper abscessation can develop because drainage to the upper surface of the skin is obstructed. This can greatly confuse the clinical presentation.

Successful resolution of a dermoid sinus requires complete removal of the abnormal tissue. This requires a meticulous dissection. Computed tomography (CT) or magnetic resonance imaging of the affected area is always helpful to guide the dissection.

## KEY LEARNING OBJECTIVES

- Recognize the potential for persistent draining sinuses to be associated with conditions other than migrating foreign material
- Understand the development aetiology of dermoid sinuses, and the importance of knowing their full extent prior to surgical exploration
- Appreciate the need for sound surgical technique to reduce the potential for intra-abdominal adhesions, which may be the cause of occult or overt clinical signs later in life

## MULTIPLE CHOICE QUESTIONS

1. When may recurrence or persistence of a draining sinus occur?
  - (A) A foreign body was not located at the original surgery
  - (B) A CT scan was not performed
  - (C) The animal lives near or is walked regularly on grassy terrain
  - (D) An infective nidus persists after exploratory surgery
2. Which of the following statements about dermoid sinus is INCORRECT?
  - (A) Dermoid sinuses have been reported to develop along the length of the spinal cord and the nose
  - (B) Category IV sinuses can connect with the spinal cord, with risk for infection spreading to the central nervous system
  - (C) Dermoid sinuses may be occult, and not manifest as a clinical disease until later in life
  - (D) A contrast fistulogram should never be performed as it may allow infective material to be spread into the cerebrospinal fluid
3. Which of the following statements about interdigital cysts developing in the interdigital webbing of dogs is correct?
  - (A) They can be controlled with long courses of antibiotics, soaking of the feet with antiseptic solutions or immunosuppressive medications
  - (B) Fusion podoplasty may be required for salvage of severe cases
  - (C) Interdigital cysts develop due to ruptured/ inflamed hair follicles on the ventral skin surface, with the inflammation tracking dorsally
  - (D) All of the above



Saturday 6 April  
Hall 4

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# Neurology

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- 108 08:30–09:15  
**How to get the most from your neurological examination**  
Steven De Decker
- 109 09:25–10:10  
**Cerebrovascular diseases: do dogs have strokes?**  
Richard LeCouteur
- 110 11:05–11:50  
**Poorly puppies: neurological disease in the young animal**  
Steven De Decker
- 111 12:00–12:45  
**Cervical spondylomyelopathy ('Wobblers'): diagnosis and treatment options**  
Steven De Decker
- 112 14:05–14:50  
**Spinal cord disorders on a budget**  
Richard LeCouteur
- 113 15:00–15:45  
**Cranial nerve disorders: figuring out the floppy faces**  
Richard LeCouteur
- 114 16:50–17:35  
**A logical approach to vestibular disease**  
Steven De Decker

## How to get the most from your neurological examination

**Steven De Decker**

After performing a neurological examination, you can answer the following questions: Does the animal have a neurological disease? Which part of the nervous system is affected? And sometimes you can determine the prognosis. This information is crucial for obtaining a reliable list of differential diagnoses.

### BASIC COMPONENTS OF THE NEUROLOGICAL EXAMINATION

The neurological examination can be divided into the *hands-off* and *hands-on* examinations. The hands-off examination is of great importance and often reveals key findings. The neurological examination is further divided into seven components.

- **Mentation and behaviour:** progressively decreasing levels of mentation are obtundation, stupor and coma. Mentation can be decreased in forebrain and brainstem disorders. Examples of abnormal behaviour include circling, compulsive pacing and head pressing. Abnormal behaviour is suggestive of forebrain disease
- **Posture and gait:** abnormalities in posture include low head carriage, kyphosis, head tilt. Abnormalities in gait include paresis, ataxia and lameness
- **Proprioception:** proprioceptive deficits are a reliable indicator for the presence of neurological disease. Proprioceptive deficits can occur in forebrain, brainstem and spinal disease
- **Cranial nerves:** isolated cranial nerve deficits can be associated with specific idiopathic conditions. Certain combinations of cranial nerve deficits can be suggestive for inner ear localizations, while multiple cranial nerve deficits can occur in brainstem or generalized lower motor neuron disorders
- **Spinal reflexes:** evaluation of spinal reflexes is indicated to recognize lower motor neuron disease, and to evaluate which spinal cord segment is affected in animals with spinal disease
- **Spinal palpation:** it is important to start with gentle palpation when you suspect the presence of spinal pain
- **Nociception:** because this part of the examination is unpleasant, evaluation of nociception or 'pain sensation' should only be performed in paraplegic and comatose animals

### DETERMINING THE NEUROANATOMICAL LOCALIZATION

The combination of clinical signs and findings of the neurological examination is used to determine the

neuroanatomical localization. This will consist of one of the following: forebrain, cerebellum, brainstem, spinal cord and neuromuscular.

- **Forebrain:** clinical signs include seizures, decreased mentation, abnormal behaviour and central blindness. Additional neurological deficits include decreased menace response, decreased response after stimulation of the nasal mucosa and proprioceptive deficits
- **Cerebellum:** clinical signs include ataxia without paresis, hypermetria, central vestibular disease and intention tremors. Additional neurological deficits include a decreased menace response
- **Brainstem:** clinical signs include decreased mentation, generalized ataxia, hemiparesis, tetraparesis and vestibular disease. Additional neurological deficits include proprioceptive deficits and cranial nerve deficits
- **Spinal cord:** clinical signs include a combination of ataxia and paresis, spinal hyperaesthesia, and bladder dysfunction. Additional neurological deficits include proprioceptive deficits and alterations in spinal reflexes
- **Neuromuscular:** the hallmark of neuromuscular disease is paresis without ataxia. Other clinical signs include changes in voice and regurgitation. Additional neurological deficits can include decreased spinal reflexes and cranial nerve deficits

### KEY LEARNING OBJECTIVES

- Learn the basic components of a practical neurological examination
- Understand how a neuroanatomical localization is obtained by using a combination of clinical signs and neurological examination findings
- Learn how a reliable list of differential diagnoses is constructed

### MULTIPLE CHOICE QUESTIONS

1. Which statement is CORRECT about evaluating spinal reflexes?
  - (A) Spinal reflexes are evaluated to determine prognosis
  - (B) Spinal reflexes are evaluated to determine the neuroanatomical localization
  - (C) Spinal reflexes are unaffected in generalized lower motor neuron disease
  - (D) Spinal reflexes are decreased in brainstem disease
2. Which statement is TRUE about proprioceptive deficits?
  - (A) Proprioception is typically decreased in cerebellar disease
  - (B) Proprioception is typically intact in forebrain disease
  - (C) Proprioception is typically decreased in spinal disease



- (D) Proprioception is typically decreased in animals with neuromuscular disease
3. Which statement is TRUE about forebrain disease?
- (A) Forebrain disease is the only neuroanatomical localization associated with abnormal behaviour

- (B) Forebrain disease is the only neuroanatomical localization associated with decreased mentation
- (C) Forebrain disease is often associated with ataxia
- (D) Forebrain disease does not result in proprioceptive deficits

# Cerebrovascular diseases: do dogs have strokes?

**Richard LeCouteur**

The term 'cerebrovascular disease' is defined as any abnormality of the brain resulting from a pathological process compromising its blood supply. Pathological processes of the blood vessel include occlusion of the lumen by a thrombus or embolus, rupture of a blood vessel wall, lesion or altered permeability of the vessel wall and increased viscosity or other changes in the quality of the blood. A cerebrovascular accident (CVA), also known as stroke, is the most common clinical presentation of cerebrovascular disease, defined as a sudden onset of non-convulsive and non-progressive focal brain signs secondary to cerebrovascular disease.

## CAUSES

From a pathological point of view, the lesions affecting the cerebral blood vessels are divided into two broad categories:

- Ischaemic stroke, resulting from occlusion of a cerebral blood vessel by a thrombus or embolism, depriving the brain of oxygen and glucose
- Haemorrhagic stroke, resulting from rupture of a blood vessel wall within the brain parenchyma or subarachnoid space, causing bleeding into or around the brain

## CLINICAL SIGNS

In ischaemic or haemorrhagic stroke, it is the abruptness with which the neurological deficits develop that is highly suggestive of the disorder as being vascular. This event is then followed by a plateau and then resolution of the neurological deficit in all except the fatal strokes. Worsening oedema can result in progression of neurological signs for 24–72 hours. Intracranial haemorrhage can be an exception and cause rapid progressive onset over a very short period of time. Clinical signs usually improve after 24–72 hours due to a decrease in size of the haematoma and oedema.

Neurological deficits usually refer to a focal anatomical diagnosis and depend on the neurolocalization of

the vascular insult (telencephalon, thalamus, midbrain, pons, medulla, cerebellum).

## DIAGNOSIS

Initial evaluation of animals with suspected stroke should focus on the differential diagnosis, including traumatic, metabolic, neoplastic, inflammatory/infectious and toxic encephalopathies. Fundus examination should be considered in all animals and may reveal tortuous vessels (suggestive of systemic hypertension), haemorrhage (suggestive of coagulopathy or systemic hypertension), or papilloedema (suggestive of elevated intracranial pressure (ICP)). Imaging studies of the brain (computed tomography (CT), conventional and functional magnetic resonance imaging (MRI)) are necessary to confirm stroke, define the vascular territory involved, determine the extent of the lesion, and distinguish between ischaemic and haemorrhagic stroke. Imaging studies are also necessary to rule out other causes such as tumour, trauma and encephalitis. Once stroke is confirmed, diagnostic tests focus on identifying an underlying cause.

## KEY LEARNING OBJECTIVES

- Understand the causes and pathophysiology of cerebrovascular diseases of dogs
- Recognize the clinical signs of cerebrovascular diseases in dogs
- Discuss diagnostic and treatment options for cerebrovascular diseases in dogs

## MULTIPLE CHOICE QUESTIONS

1. Which are reportedly the most common risk factors for the development of brain infarction in dogs?
  - (A) Pheochromocytoma and lymphoma
  - (B) Essential hypertension and hypoadrenocorticism
  - (C) Chronic renal failure and hyperadrenocorticism
  - (D) Hypothyroidism and dilated cardiomyopathy
2. Which drug has been shown to predispose humans to ischaemic or haemorrhagic infarction?

- (A) Amlodipine
- (B) Phenoxybenzamine
- (C) Phenylpropanolamine
- (D) Furosemide

3. Which statement regarding the use of CT in diagnosing ischaemic encephalopathies is INCORRECT?
- (A) CT is inferior to MRI in detecting ischaemic infarction

- (B) CT has demonstrated a sensitivity of 80% in detecting ischaemic infarction within 24 hours after occurrence
- (C) Acute haemorrhagic infarction tends to result in hypodense lesions that are difficult to detect
- (D) Temporal changes in CT findings following ischaemic infarction are similar to those of MRI but differ based on time from infarct to earliest detection

## Poorly puppies: neurological disease in the young animal

Steven De Decker

Evaluating puppies with neurological disease is challenging. They can be considered uncooperative patients and their body systems are still in development. Interpretation of diagnostic tests is complicated by the fact that puppies are skeletally immature, and that the nervous system is still developing. It is easy to understand that congenital anomalies and infectious disorders should be considered important differential diagnoses in puppies with neurological signs. Important factors to take into account are therefore the specific breed, general physical examination findings, health status of littermates, vaccination status and country or region of origin. The following disorders can be considered more common causes of neurological disease in puppies.

### HYPOGLYCAEMIA-INDUCED SEIZURES

This is one of the most common causes of seizures in puppies and occurs most often in toy-breed dogs. This cause of seizures should be immediately suspected in every toy-breed puppy with acute onset seizures. Treatment consists of administration of glucose.

### HYDROCEPHALUS

This is the most common brain malformation. Although every breed can be affected, it occurs most often in toy and brachycephalic breeds. Affected dogs can have a dome-shaped head. Although little is known about the natural progression of this condition, selected cases can be treated medically. Surgical treatment consists of placement of a ventriculoperitoneal shunt.

### THORACIC HEMIVERTEBRA

This condition typically affects 'screw-tailed' brachycephalic dogs. Hemivertebra can be associated with an

abnormal dorsal (kyphosis) or lateral (scoliosis) curvature of the spine. Although this condition can cause progressive spinal cord dysfunction, it should most often be considered an incidental finding on diagnostic imaging studies. Up to 94% of neurologically normal French bulldogs have radiographic evidence of hemivertebra. Hemivertebra are more likely associated with clinical signs when they occur in Pugs and when they are associated with severe kyphosis. Recent information suggests a poor response to medical management, while surgical treatment is technically challenging.

### SPINAL ARACHNOID DIVERTICULA

This is probably the most clinically important spinal malformation. This condition is characterized by a focal dilatation of the subarachnoid space with progressive accumulation of cerebrospinal fluid. The most common locations are the cranial cervical vertebral column in large-breed and the thoracolumbar vertebral column in small-breed dogs. Pugs, French Bulldogs and Rottweilers are predisposed to this condition. Medical management results in 30% improvement, while surgery results in 80% long-term improvement.

### ATLANTO-AXIAL INSTABILITY

This condition most often affects toy-breed dogs and is characterized by a dorsal and cranial displacement of the axis relative to the atlas. It is often associated with abnormalities of the dens and failure of ligamentous support. Excessive cervical flexion in a dog with atlanto-axial instability can have devastating and even fatal consequences. Selected cases can be treated medically, while surgery is technically demanding.

### STEROID-RESPONSIVE MENINGITIS AND ARTERITIS

Affected animals have a typical clinical presentation consisting of severe cervical hyperaesthesia, lethargy, pyrexia and a stiff gait. Blood work often demonstrates a leucocytosis and a diagnosis is confirmed by evaluation of cerebrospinal fluid. Although relapses are possible, most dogs respond favourably to a prolonged period of corticosteroids.

## KEY LEARNING OBJECTIVES

- Understand why the neurological assessment in puppies is often more complicated than in mature dogs
- Become familiar of the most common neurological disorders that affect puppies
- Learn how common neurological conditions are diagnosed and treated in puppies

## MULTIPLE CHOICE QUESTIONS

1. Spinal arachnoid diverticula most often occur in which of the following?
  - (A) Labrador Retrievers and Pugs
  - (B) French Bulldogs and Labrador Retrievers
  - (C) German Shepherd Dogs and Rottweilers
  - (D) Pugs and French Bulldogs
2. Which statement is correct about hemivertebra?

- (A) Medical management is associated with a good prognosis
- (B) Hemivertebra are more likely to result in clinical signs when associated with severe kyphosis
- (C) Hemivertebra are more clinically relevant in French Bulldogs compared to Pugs
- (D) Hemivertebra occur rarely in neurologically normal dogs

3. Which statement is correct about atlanto-axial instability?
  - (A) Excessive flexion can have devastating and even fatal consequences
  - (B) This condition most often affects Rottweilers
  - (C) Most affected cases have a normal dens
  - (D) This condition is characterized by a caudal and ventral displacement of the axis relative to the atlas

# Cervical spondylomyelopathy ('Wobblers'): diagnosis and treatment options

Steven De Decker

Cervical spondylomyelopathy or 'wobbler syndrome' is a complex, multifactorial, incompletely understood and controversial neurological syndrome. It can be considered a collective term for disorders in which cervical vertebral canal stenosis is caused by a combination of soft tissue and bony structures. Two major forms have been recognized: disc-associated (DA-CSM) and osseous-associated cervical spondylomyelopathy (OA-CSM). Clinical signs reflect those of a chronic and progressive cervical myelopathy.

## DISC-ASSOCIATED CERVICAL SPONDYLOMYELOPATHY

This condition typically affects older (>7 years old) large-breed dogs with the Doberman being over-represented in most studies. As the name suggests, caudal cervical spinal cord compression is caused by chronic protrusion of one or multiple intervertebral discs. The intervertebral discs at C6–C7 and C5–C6 are most often affected. In up to 50% of cases, multiple sites of spinal cord compression are observed. Other abnormalities that can be seen are dorsal spinal cord compression caused by ligamentum flavum hypertrophy, and an abnormal position and (mildly) abnormal shape of vertebral bodies. Although the diagnosis can be made by myelography and post-myelography computed tomography, magnetic

resonance imaging (MRI) is the imaging modality of choice. A high prevalence of complications is seen when myelography is used for the diagnosis of cervical spondylomyelopathy. The application of traction studies has been reported and can influence the choice of therapy. The application of dynamic studies with the neck in flexion and extension is more controversial and not necessarily part of a standard diagnostic approach.

Treatment of DA-CSM is considered one of the most controversial topics in veterinary neurology. Outcome after medical management is guarded with several studies suggesting around 40% success rates. More than 20 surgical techniques have been and are being reported for this technique. This large number of techniques reflects the difficulty of treating this disorder and the fact that the best surgical technique is yet unknown. The reported surgical techniques can broadly be divided into three categories:

- Direct decompressive surgery by a ventral slot procedure
- Distraction–stabilization techniques
- Motion preservation techniques by artificial disc implants

Although most authors claim a success rate of 75%, up to a quarter of successfully treated cases will develop clinical signs at an adjacent intervertebral disc space. This is referred to as 'adjacent segment disease'.

## OSSEOUS-ASSOCIATED CERVICAL SPONDYLOMYELOPATHY

This condition typically affects young adult (often 18 to 24 months of age) giant breeds, such as the Great Dane. As the name suggests, spinal cord compression is caused by bony structures. The predominant cause of cervical spinal cord compression is degeneration and hypertrophy of articular processes. In up to 85% of cases, multiple sites of spinal cord compression are seen at the time of diagnosis. Other abnormalities that can be seen are

# Neurology

ligamentum flavum hypertrophy and hypertrophy of the dorsal lamina. MRI is the diagnostic modality of choice. Little is known about the results of medical management. Surgical treatment typically consists of a (continuous) dorsal cervical laminectomy. Although long-term outcome can be favourable, up to 80% of dogs experience early postoperative neurological deterioration.

## KEY LEARNING OBJECTIVES

- Understand the difference between disc-associated (DA-CSM) and osseous-associated cervical spondylomyelopathy (OA-CSM)
- Understand the different treatment options for DA-CSM and OA-CSM
- Be aware of the prognosis and most common complications after surgical treatment for DA-CSM and OA-CSM

## MULTIPLE CHOICE QUESTIONS

1. Which statement is correct about disc-associated cervical spondylomyelopathy?  
(A) It most often affects young mature giant-breed dogs

- (B) Computed tomography is the diagnostic method of choice
- (C) The intervertebral disc spaces at C6–C7 and C5–C6 are most often affected
- (D) Medical treatment is associated with an excellent prognosis

2. Which statement is correct about osseous-associated cervical spondylomyelopathy?  
(A) The Doberman is over-represented in most studies  
(B) Spinal cord compression is typically caused by hypertrophy of the articular processes  
(C) Distraction–stabilisation surgery is a common surgical technique  
(D) Older (>7 years of age) large-breed dogs are most often affected
3. Which of the following is an important long-term complication after surgery for disc-associated cervical spondylomyelopathy?  
(A) Adjacent segment disease  
(B) Incomplete bony fusion  
(C) Vertebral subluxation  
(D) Collapse of the operated intervertebral disc space

# Spinal cord disorders on a budget

**Richard LeCouteur**

A question faced by most veterinarians in private practice is: How do I approach a case with suspected spinal cord disease when referral is not an option due to financial limitations of the owner?

This lecture will discuss the two major aspects of this issue. First, what can be done *before* an animal with a spinal cord disorder is presented to a practitioner? Second, what can be done *after* an animal with a spinal cord problem has been presented to a practitioner?

## PRACTISING PREVENTATIVE CARE

- Inform your clients regarding the costs of veterinary care
- Advise clients to make a budget
- Advise clients to be proactive with the health of their pet
- Advise clients to schedule regular check-ups for their pet

## FOLLOWING THE DIAGNOSTIC PLAN

Clinical signs associated with spinal cord dysfunction depend upon the location, the size and the rate of

development, of a lesion. The abilities to complete and interpret results of a neurological examination, compile a list of differential diagnoses and understand the available diagnostic procedures and current treatment recommendations, are essential in the management of spinal cord disorders of cats and dogs.

Clinical syndromes affecting the spinal cord may be characterized by a single focal lesion (transverse myelopathy) or by several focal lesions (multifocal disorders). Myelopathies may be extrinsic, in which spinal cord dysfunction is secondary to diseases of the vertebrae, meninges or epidural space, or may be intrinsic, in which the disease begins as an intramedullary lesion. Extrinsic myelopathies are almost always transverse myelopathies.

As the nervous system can respond in only a limited number of ways to the numerous causes of myelopathies, it is necessary to follow a systematic diagnostic approach in an animal with a spinal cord disorder.

## KEY LEARNING OBJECTIVES

- Understand what can be done *before* an animal with a spinal cord disorder is presented to a practitioner
- Understand what can be done *after* an animal with a spinal cord disorder is presented to a practitioner
- Discuss the limitations and benefits of using 'clinical reasoning' to aid decision making in the treatment of animals with suspected spinal cord disease

## MULTIPLE CHOICE QUESTIONS

- When referral to a specialist is not an option due to financial limitations of the owner, which is the most critical factor in managing a case with suspected spinal cord disease?
  - Radiographs of the entire vertebral column
  - An accurate neurological examination
  - Cerebrospinal fluid analysis
  - A complete blood count and serum chemistry panel
- Certain spinal cord diseases consistently may be associated with a particular signalment, onset, progression and manifestation of apparent spinal pain. Which of the following disorders is most likely to have a chronic progressive course in the absence of apparent spinal pain?
  - Ischaemic myelopathy
  - Intervertebral disc extrusion
  - Degenerative lumbosacral stenosis
  - Degenerative myelopathy
- The following clinical signs of spinal cord dysfunction are most consistent with a lesion in which location?
  - Ataxia and paresis of all four limbs
  - Proprioceptive positioning deficits in all four limbs
  - Normal or decreased spinal reflexes in thoracic limbs and normal or exaggerated spinal reflexes in pelvic limbs
  - Depressed or absent cutaneous trunci reflex unilaterally or bilaterally
  - Cervical (C1 to C5)
  - Cervical enlargement (C6 to T2)
  - Thoracolumbar (T3 to L3)
  - Lumbar enlargement (L4 to Cd5) and cauda equina

## Cranial nerve disorders: figuring out the floppy faces

**Richard LeCouteur**

In this lecture several common disease processes that result in peripheral cranial neuropathies in dogs and/or cats will be discussed.

### OTITIS INTERNA

Inner ear infection (otitis interna) is the most common cause of peripheral vestibular disease in dogs and cats. It typically results from extension of bacterial infection within the external ear canal through a ruptured tympanic membrane, or from the nasopharynx via the auditory tube.

The most commonly identified pathogens in dogs include *Staphylococcus* spp., *Streptococcus* spp., *Proteus* spp. and *Pseudomonas* spp. In cats, *Staphylococcus* spp., *Streptococcus* spp., *Pasteurella* spp. and anaerobic bacteria are the most commonly involved.

### TRIGEMINAL NEURITIS AND IDIOPATHIC TRIGEMINAL NEUROPATHY

The most frequently recognized inflammatory entity in dogs affecting peripheral branches of cranial nerves is trigeminal neuritis or idiopathic trigeminal neuropathy. Affected dogs typically have an acute onset of clinical signs secondary to bilateral motor branch dysfunction of the trigeminal nerves. This bilateral involvement of the trigeminal nerve results in inability to close the mouth (drop jaw), difficulty prehending food, and drooling. About

33% of dogs have sensory involvement of the trigeminal nerve, and <10% have Horner's syndrome or facial nerve dysfunction. While the underlying pathogenesis of this disease is not known, it is believed to be non-infectious and inflammatory in origin.

### NERVE SHEATH TUMOURS

Nerve sheath tumours (NSTs) are perhaps the most common cause of chronic, progressive peripheral cranial nerve disease in older dogs. They arise from Schwann cells or pericytes, are typically slow growing, and are invasive to surrounding nervous system tissue. Metastasis is a rare event. Whereas they most commonly affect the brachial plexus and lumbosacral plexus, NSTs also can arise within cranial nerves, with the trigeminal nerve most frequently affected.

### IDIOPATHIC FACIAL NERVE PARALYSIS

Approximately 50% of dogs with peripheral facial nerve weakness are diagnosed with idiopathic facial nerve paralysis. Clinical signs are often relatively acute in onset. Cocker Spaniels are believed to be over-represented, and affected dogs usually are older than 5 years. Dysfunction may be bilateral or unilateral. The underlying aetiopathogenesis of idiopathic facial nerve paralysis in dogs is unknown but has been speculated to involve immune-mediated neuritis or viral infection.

### IDIOPATHIC VESTIBULAR SYNDROME

Idiopathic vestibular syndrome occurs in older dogs and cats of any age. It results in acute-onset, unilateral vestibular dysfunction, without concurrent Horner's syndrome or facial nerve signs. The underlying aetiopathogenesis is unknown, but possibilities include transient viral infection similar to vestibular neuritis in humans or disturbance in endolymph flow, as seen in Ménière's disease in humans.

## CAVERNOUS SINUS SYNDROME

The cavernous sinus is a paired venous sinus that runs along either side of the pituitary gland on the floor of the calvarium. Cavernous sinus syndrome (CSS) refers to deficits in more than one of the cranial nerves III, IV, V and VI, as they are in close association in this region. Mydriasis and ophthalmoplegia are common signs of CSS. A mass lesion within the cavernous sinus is the most common cause.

## KEY LEARNING OBJECTIVES

- Understand the most commonly occurring cranial neuropathies of dogs and cats
- Understand Idiopathic trigeminal neuropathy and idiopathic facial neuropathy
- Discuss the localization of vestibular disorders and distinguish between peripheral, central and bilateral vestibular syndromes

## MULTIPLE CHOICE QUESTIONS

1. You are presented with an 8-year-old Rottweiler with an acute onset of head tilt to the left, rolling and falling to left, and a non-positional, rotary nystagmus with the fast phase to the right (and slow phase to the left). Also, the dog has facial weakness on the left

side and the left eye has a Horner's syndrome. The remainder of the neurological and physical examination is normal. What is the most likely neuroanatomical diagnosis to account for all the above clinical signs?

- (A) Left-sided middle/inner ear
  - (B) Right-sided middle/inner ear
  - (C) Left-sided brainstem
  - (D) Right-sided brainstem
2. Which of the following is NOT a function of the facial nerve (cranial nerve VII)?
    - (A) Sensory for taste (rostral two-thirds of tongue)
    - (B) Motor to the muscles of facial expression
    - (C) Innervates sublingual and mandibular salivary glands
    - (D) Sensory to the nasal mucosa, cornea and face
  3. Which of the following clinical signs is PRESENT on the affected side of the head of a dog with a unilateral Horner's syndrome?
    - (A) Exophthalmos
    - (B) Mydriasis
    - (C) Retraction of the third eyelid (nictitating membrane)
    - (D) Failure of the pupils to dilate to equality in the dark

## A logical approach to vestibular disease

Steven De Decker

The vestibular system has a complex anatomy and clinical signs can be localized by disorders outside or inside the central nervous system. These locations are also referred to as peripheral or central vestibular disease, respectively. The peripheral portions of the vestibular system consist of receptors in the inner ear, and the vestibulocochlear nerve (CN VIII). The central vestibular components are located in the brainstem and cerebellum.

## CLINICAL SIGNS IN VESTIBULAR DISEASE

Dysfunction of the vestibular system can be associated with a combination of clinical signs. Head tilt is easy to recognize and the ventrally deviated ear is most often directed towards the affected side. Vestibular ataxia is characterized by a wide-based stance and a tendency to fall, drift or even roll towards the side of the lesion. Affected animals can also demonstrate circling towards the affected side with the circles being very tight. Ocular abnormalities can be more difficult to recognize and consist of pathological nystagmus and strabismus. Nystagmus, or the involuntary movement of eyes, is typically characterized by a jerk nystagmus, with the fast

phase directed away from the lesion. The orientation of nystagmus can be horizontal, rotary, or vertical. Nystagmus can be physiological, which is evaluated during the vestibulo-ocular reflex, or pathological. Pathological nystagmus can be classified as spontaneous/resting or positional nystagmus. Animals with vestibular disease can also demonstrate ipsilateral ventrolateral strabismus.

## DIFFERENTIATION BETWEEN PERIPHERAL AND CENTRAL VESTIBULAR DISEASE

Peripheral and central vestibular syndrome are associated with different underlying conditions and a different diagnostic approach (not necessarily a different prognosis). Because central vestibular disease is associated with disorders affecting the cerebellum or brainstem, affected animals can demonstrate other brainstem or cerebellum signs. Presence of proprioceptive deficits and hemiparesis, tetraparesis, decreased mentation and multiple cranial nerve deficits are therefore suggestive for central vestibular syndrome. Because the facial nerve (CN VII) and the sympathetic nerve are closely related to the inner ear, facial nerve paralysis and Horner's syndrome can be seen in animals with peripheral vestibular syndrome. Although debatable, pure vertical nystagmus is considered suggestive for central vestibular syndrome. Nystagmus that changes direction when the position of the head is changed and disconjugate nystagmus are also indications for central vestibular disease. Disconjugate nystagmus is characterized by both eyes demonstrating nystagmus in a different direction. Although the presence of these

abnormalities is suggestive for central vestibular syndrome, their absence does not exclude a central localization. A central vestibular localization can be ruled in, but not ruled out.

## COMMON CAUSES OF VESTIBULAR DISEASE

Common causes of peripheral vestibular disease include otitis interna, nasopharyngeal polyps, aural neoplasia, inner ear trauma, congenital vestibular disease, hypothyroidism, idiopathic (geriatric) vestibular syndrome and ototoxic drugs. Common causes of central vestibular syndrome are neoplastic and inflammatory conditions, hydrocephalus, thiamine deficiency, metronidazole intoxication, trauma and cerebrovascular disease.

Animals with vestibular disease can also present as neurological emergencies. Two conditions are typically associated with a peracute onset of severe vestibular signs: cerebrovascular disease and idiopathic (geriatric) vestibular syndrome.

## KEY LEARNING OBJECTIVES

- Recognize the clinical signs associated with vestibular disease
- Be aware of the anatomical structures that can cause vestibular disease
- Be able to recognize indications for central vestibular disease

## MULTIPLE CHOICE QUESTIONS

1. Which statement is correct about central vestibular disease?
  - (A) Animals with central vestibular disease have a poor prognosis
  - (B) Central vestibular disease can be caused by a brainstem disorder
  - (C) Central vestibular disease can be caused by a lesion affecting the vestibulocochlear nerve
  - (D) Central vestibular disease can be caused by a lesion affecting the cerebral cortex
2. Which of the following findings is suggestive for a central vestibular syndrome?
  - (A) Head tilt
  - (B) Spontaneous nystagmus
  - (C) Proprioceptive deficits
  - (D) Strabismus
3. Which cranial nerve can be affected in peripheral vestibular disease?
  - (A) Facial nerve
  - (B) Trigeminal nerve
  - (C) Optic nerve
  - (D) Hypoglossal nerve





Saturday 6 April  
Hall 5

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# Cardiorespiratory

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- 118 08:30–09:15  
**Approach to the young coughing dog**  
Simon Tappin
- 119 09:25–10:10  
**Older dog with a cough: is it cardiac or respiratory?**  
**Top tips on how to tell**  
Simon Tappin
- 120 11:05–11:50  
**Approach to pulmonary hypertension**  
Kieran Borgeat
- 121 12:00–12:45  
**How I perform bronchoscopy**  
Simon Tappin
- 122 14:05–14:50  
**Thoracic imaging picture quiz: is it cardiac or respiratory?**  
Kieran Borgeat
- 123 15:00–15:45  
**The punctured pet: dealing with thoracic bite wounds/stick injuries**  
Georga Karbe
- 124 16:50–17:10  
**Top tips on chest drain placement**  
Georga Karbe
- 125 17:15–17:35  
**Top tips on thoracic cytology**  
Kathleen Tennant
- 126 17:40–18:00  
**Diagnosis and medical management of pyothorax**  
Simon Tappin
- 127 18:10–18:30  
**Diagnosis and surgical management of pyothorax**  
Georga Karbe

## Approach to the young coughing dog

Simon Tappin

Coughing is a protective mechanism which allows clearance of debris from the airway. Airway irritation and inflammation, excessive secretions and airway collapse will all trigger coughing. Productive or moist coughs are usually seen in infectious or inflammatory airway conditions; however harsh or dry coughs can be seen in the earlier stages of disease.

As with any medical problem, evaluation starts by taking a detailed history, this is followed by a full clinical examination and careful thoracic auscultation of both the heart and the lung fields. In young dogs, acute-onset coughing is likely to represent infectious causes, such as infectious tracheobronchitis (ITB, 'kennel cough'), or parasites, such as *Angiostrongylus vasorum* or *Oslerus osleri*. However, airway foreign bodies, pneumonia (for example secondary to inhalation) and cardiac disease should also be considered possible causes, especially if signs are not self-limiting.

Canine ITB is highly contagious and common in any large transient population of dogs. Dogs typically present with an acute-onset paroxysmal coughing (which may be productive) and sometimes oculonasal discharge. Many different agents contribute to the clinical syndrome of ITB, and multiple infections are likely to be common. The most frequently isolated agents are *Bordetella bronchiseptica* and canine parainfluenza virus. Other agents including adenovirus, herpesvirus and reoviruses are isolated on occasions. The use of antibiotics in ITB cases generally has limited efficacy and is rarely indicated unless there are signs of bronchopneumonia or systemic infection. Antimicrobial resistance is widely reported in *Bordetella* species, so when required doxycycline or trimethoprim/sulphonamide are usually used. In uncomplicated cases if the coughing is severe, anti-tussives (butorphanol or codeine), anti-inflammatories (non-steroidal anti-inflammatory drugs (NSAIDs) or low-dose prednisolone) and bronchodilators (theophylline, terbutaline) may be helpful.

Respiratory parasites such as *Oslerus osleri* or *Crenosoma vulpis* are uncommon. However, in the last couple of decades disease due to infection with *Angiostrongylus vasorum* has been increasingly documented across most of the UK, linked to the increased prevalence of infection in foxes and their increasing urbanization. Historically cases were limited to the south of Wales, and both the southeast and southwest of England, however recently both the incidence and geographical distribution appears to be increasing, with cases now being reported in northern England and Scotland. Most dogs develop

coughing due to larval migration, however a significant proportion develop signs secondary to coagulopathy. A rapid point-of-care blood test with good sensitivity and specificity has recently become available, greatly improving the ease of diagnosis. Imidacloprid/moxidectin, milbemycin and fenbendazole are all effective treatment options, with imidacloprid/moxidectin and milbemycin also being effective prophylactic treatments.

With acute-onset coughing in the clinically well dog, faecal parasitology or trial treatment will allow exclusion of respiratory parasites and symptomatic therapy may be appropriate at this stage. Thoracic radiographs are usually the first imaging step in further evaluating the cause of a more chronic or severe cough. Further investigations such as echocardiography, endoscopy and collection of airway wash samples may then be indicated.

### KEY LEARNING OBJECTIVES

- Coughing is a protective mechanism that allows clearance of debris from the airway
- In young dogs, infectious causes, such as infectious tracheobronchitis or parasitic infection, are most common
- Antibiotics are rarely indicated in well animals with acute-onset coughing

### MULTIPLE CHOICE QUESTIONS

1. Which of the following viruses has NOT been implicated as a cause of canine infectious tracheobronchitis?  
(A) Canine herpesvirus  
(B) Canine poxvirus  
(C) Canine adenovirus 1  
(D) Canine influenza virus
2. Which of the following statements about *Angiostrongylus vasorum* is correct?  
(A) Fenbendazole is licensed for treatment of clinical disease  
(B) Angiostrongylosis only occurs in young dogs  
(C) A history of snail or slug ingestion is always documented when angiostrongylosis is present  
(D) Increased levels of infection within the fox population have led to an increased prevalence and range of the parasite
3. Which of the following is NOT a canine respiratory parasite?  
(A) *Angiostrongylus vasorum*  
(B) *Crenosoma vulpis*  
(C) *Oslerus osleri*  
(D) *Aelurostrongylus abstrusus*

# Older dog with a cough: is it cardiac or respiratory? Top tips on how to tell

**Simon Tappin**

Airway irritation and inflammation, excessive secretions and airway collapse will all trigger coughing. Whilst coughing is a protective mechanism which allows clearance of debris from the airway, coughing excessively can be extremely frustrating for patient and owner alike.

In older dogs, acute-onset coughing is most likely infectious such as secondary to infectious tracheobronchitis (ITB, 'kennel cough') or parasites such as *Angiostrongylus vasorum* or *Ostertesia osleri*. However, chronic coughing, usually defined as a cough that has been present for more than 8 weeks, is more prevalent with increasing age and chronic bronchitis, tracheal collapse, laryngeal paralysis, neoplasia, pulmonary fibrosis and congestive heart failure all need to be considered as possible causes. Diagnosis may not be straightforward, as several aetiologies may be present in older patients, worsening the signs seen. For example, there is usually much debate as to the cause of coughing in small-breed dogs with congestive heart failure. The presence of pulmonary oedema alone does not usually lead to coughing, however the presence of bronchomalacia leading to bronchial collapse will, and this may be exacerbated by dilation of the left atrium leading to airway compression.

As with any medical problem, evaluation starts by taking a detailed history, this is followed by a full clinical examination and careful thoracic auscultation of both the heart and the lung fields. In acute-onset coughing in the clinically well dog, faecal parasitology or trial treatment will allow exclusion of respiratory parasites and symptomatic therapy may be considered appropriate at this stage.

For more chronic cases blood work is usually a good starting point, to exclude concurrent illness, although is rarely specific for the aetiology of the cough. Measurement of NT-proBNP, which is produced by cardiac muscle in response to volume overload, is helpful to ascertain if animals may be coughing due to cardiac or respiratory disease, allowing further diagnostic tests to be better focused. Thoracic radiographs are usually the first imaging step, either conscious if there are concerns about cardiac function or, where possible, inflated views under general anaesthesia. Note that if tracheal collapse is considered, both inspiratory and expiratory phases will be required to make a diagnosis. Where cardiac disease is suspected, echocardiography will be helpful to assess

cardiac structure and contractility. The information gained by cardiac ultrasonography will vary depending on the degree of experience of the operator, however simple objective measurements such as left atrium to aortic root ratio (LA:Ao) and left ventricular fractional shortening will be helpful in determining if cardiac disease is present. When airway disease is suspected, endoscopic evaluation and collection of airway wash samples is helpful in understanding the underlying aetiology and making treatment decisions.

Treatment will depend on the underlying aetiology and focus on addressing the cause of excessive coughing, such as limiting airway inflammation in chronic bronchitis or controlling congestive change in heart dogs with heart failure. Anti-tussives should be used judiciously, but will help limit airway sensitivity and as a result improve quality of life.

## KEY LEARNING OBJECTIVES

- Coughing is a protective mechanism that allows clearance of material from the airway
- Measurement of cardiac biomarkers, such as NT-proBNP, may help differentiate cardiac from respiratory disease as the cause of coughing, however they do not replace imaging in making a diagnosis
- Thoracic radiographs are the mainstay of diagnostic evaluation for the coughing dog

## MULTIPLE CHOICE QUESTIONS

1. Which of the following types of cough would usually be associated with tracheal collapse?
  - (A) A honking or seal bark cough
  - (B) A dry, hacking cough
  - (C) A nocturnal cough
  - (D) A soft ineffectual cough
2. Which of the following statements is INCORRECT?
  - (A) Inspiratory dyspnoea reflects upper airway disease
  - (B) Hearing wheezing on thoracic auscultation suggests airway narrowing
  - (C) Percussion will always determine the presence of pleural effusion
  - (D) Expiratory dyspnoea reflects parenchymal disease
3. Which of the following values for aortic root ratio (LA:Ao) would be supportive of the presence of congestive heart failure?
  - (A) <1.2
  - (B) <1.6
  - (C) >1.4
  - (D) >1.6

# Approach to pulmonary hypertension

Kieran Borgeat

## PHYSIOLOGY AND BACKGROUND

The pulmonary system can be described as low pressure, high flow. Resistance in the pulmonary vasculature is very low, with a huge surface area of capillaries to maximize surface area for gas exchange. Pulmonary arterial pressure in normal animals is around 25–30 mmHg systolic, and 10 mmHg diastolic. Since the primary function of the pulmonary arteries is to perfuse oxygenated regions of the lung to re-oxygenate blood and return it to the left heart, vasoconstriction occurs in response to hypoventilation and/or hypoxia. This is a key contrast with the systemic vasculature, where hypoxic tissue requires perfusion, so vasodilation occurs. Another difference to the systemic vessels lies in the response to high flow; most systemic vessels subject to increased flow rates will vasodilate, to perfuse the tissue downstream. In contrast, pulmonary vessels will vasoconstrict in the face of increased flow – presumably an evolutionary adaptation to prevent the development of pulmonary oedema or downstream capillary damage. These basic facts help us to understand the response of pulmonary vessels in states of disease, where these changes can become maladaptive and generate pulmonary hypertension.

## DEFINITION AND CLASSIFICATION OF PULMONARY HYPERTENSION

Pulmonary hypertension (PH) is defined as pulmonary arterial pressure (PAP) >35 mmHg, and can be graded as mild (35–50 mmHg), moderate (50–80 mmHg) or severe (>80 mmHg). Classification of pulmonary hypertension is given in Figure 1. Diagnosis can be made by direct measurement using a catheter placed in the pulmonary artery or right ventricle (RV) – where systolic pressure approximates PAP. Practically, a less invasive method of assessing PAP is to perform echocardiographic measurements based on Doppler estimates of tricuspid or pulmonic regurgitation velocity. Since tricuspid regurgitation velocity is dependent on the pressure difference between the RV and right atrium (RA) in systole, and RV pressure in systole is similar to PAP, we can use this measurement of tricuspid regurgitation to infer PAP.

### Worked example

Tricuspid regurgitation velocity measures 4.5 m/s  
Pressure gradient between RV and RA  
= 4 × (maximum velocity)<sup>2</sup>  
= 4 × (4.5)<sup>2</sup>  
= 4 × 20.25 = 81 mmHg  
In this case, the pressure in the right ventricle is *at least* 81 mmHg, indicating severe PH.  
One recent study suggests that echocardiographic methods underestimate PAP, and prior publications suggest that Doppler estimates of PA pressure may not change in line with clinical improvements in dogs treated for PH. Clearly, echo estimates of PA pressure are imperfect, but are non-invasive and useful enough to make clinical decisions.

Class	Description	Examples
1	Pulmonary arterial hypertension	Associated with congenital L>R shunting disease (e.g. large PDA, large VSD) Primary idiopathic Drug or toxin induced
2	Secondary to left heart disease	Mitral valve disease Left ventricular systolic dysfunction Left ventricular diastolic dysfunction Congenital diseases affecting the left heart (e.g. mitral dysplasia or stenosis)
3	Secondary to lung diseases or hypoxia	Interstitial lung disease (e.g. fibrosis) Chronic obstructive pulmonary disease Chronic exposure to high altitude
4	Thrombotic or obstructive causes	Chronic or acute pulmonary thromboembolism Parasitism (e.g. <i>Dirofilaria immitis</i> , <i>Angiostrongylus vasorum</i> ) Intravascular tumours
5	Unclear/multifactorial mechanisms	Paraneoplastic syndromes Chronic haemolytic anaemia and other haematological disorders <sup>a</sup> Glycogen storage diseases <sup>a</sup>

**Figure 1:** Classification of pulmonary hypertension (based on European Society of Cardiology guidelines, 2015)  
<sup>a</sup>uncertain if occurs in animals; PDA, patent ductus arteriosus; VSD, ventricular septal defect

## KEY LEARNING OBJECTIVES

- Understand which aspects of pulmonary vascular physiology can become maladaptive and lead to pulmonary hypertension
- Identify cases in practice which may be suffering from pulmonary hypertension, and understand how to make a diagnosis
- Consider treatment of pulmonary hypertension in different disease contexts, and understand what outcomes can be expected

## MULTIPLE CHOICE QUESTIONS

1. How would pulmonary hypertension in dogs with a large ventricular septal defect be classified?
  - (A) Type 1 – pulmonary arterial hypertension
  - (B) Type 2 – secondary to left heart disease
  - (C) Type 4 – obstructive causes of PH

- (D) Type 5 – unclear/multifactorial causes
2. What is the mechanism of syncope in pulmonary hypertension thought to be related to?
  - (A) Ventricular arrhythmias caused by right ventricular hypertrophy
  - (B) Reduced left heart output caused by increased right heart filling
  - (C) Vagal output secondary to right ventricular pressure overload
  - (D) Long pauses in cardiac rhythm associated with high vagal tone
3. What is the mechanism of action of sildenafil to cause pulmonary vasodilation?
  - (A) Phosphodiesterase III inhibition
  - (B) Phosphodiesterase V inhibition
  - (C) Stimulation of beta-2 adrenoceptors
  - (D) Antagonism of beta-1 adrenoceptors

# How I perform bronchoscopy

## Simon Tappin

Bronchoscopy allows evaluation of the larynx, trachea and bronchial tree. With good-quality endoscopes becoming more readily available, it is becoming increasingly possible to perform bronchoscopy in small animal patients in general practice. As with all forms of endoscopy, although gross evaluation may reveal a definitive diagnosis (e.g. the presence of an airway foreign body), it is most commonly performed at the end of a diagnostic pathway. Bronchoscopy is useful in many patients but is most commonly used in the assessment of chronic coughing, respiratory distress and haemoptysis. Samples can also be collected and submitted for cytology and culture.

Bronchoscopy is always performed under general anaesthesia to control reflex coughing and gagging on passage of the endoscope. Premedication with an opioid and low-dose acepromazine is used in most cases. Terbutaline, a bronchodilator, is useful to reduce bronchospasm and improve oxygenation. This is especially useful in cats and is usually given intramuscularly at the time of induction. General anaesthesia is most easily maintained by total intravenous anaesthesia (TIVA), with propofol being the agent of choice in most cases.

In large dogs the endotracheal tube may have a large enough diameter to allow passage of the endoscope, without complete occlusion of the tube (at least 25% of the diameter of the tube should remain with the endoscope in place). In cats and small dogs, the endoscope is advanced directly into the airway which does not allow assisted ventilation, so careful consideration should be given to oxygen supplementation. Bronchoscopy is best performed in sternal recumbency, with the head elevated

on a sand bag or foam pad to allow easy passage of the endoscope. A gag should be placed to protect the endoscope.

Endoscopically the lumen of the trachea should appear round with the C-shaped cartilages visible under a smooth light-pink mucosa. Once the trachea has been examined the endoscope is gradually advanced to the tracheal bifurcation or carina which is a sharp division between the left and right mainstem bronchi. The right mainstem bronchus is usually straight ahead, with the left mainstem bronchus requiring some deflection to the right to allow entry. The bronchial tree should be systematically and fully evaluated, allowing visualization of each lobar bronchus and as many segmental divisions as possible. Each lung has a cranial and caudal lobe, with the right side having both a middle and accessory lobe. Each segmental airway should be evaluated for changes in shape, size and mucosal appearance.

Once the airways have been fully examined, samples should be obtained for cytology and microbiology, as gross changes are not usually pathognomonic for specific disease. Sampling is best achieved via bronchoalveolar lavage (BAL) using 5–10-ml aliquots of sterile saline. These are instilled via a sterile wash catheter or the working channel of the endoscope, agitated within the chest by coupage and then retrieved using suction. The sample should be frothy due to the presence of surfactant and be stored in EDTA and plain tubes, for cytology and culture respectively.

## KEY LEARNING OBJECTIVES

- There are many indications for bronchoscopy, but coughing is the most common
- The normal endoscopic anatomy of the bronchial tree allows evaluation of the bronchi to all the lung lobes
- Gross inspection rarely gives a definitive diagnosis, thus bronchoalveolar lavage samples should be collected for cytology and culture

## MULTIPLE CHOICE QUESTIONS

1. Which of the following statements about bronchoscopy is correct?  
(A) Bronchoscopy can be performed under sedation  
(B) Terbutaline is useful to reduce bronchospasm and so improve ventilation  
(C) Rigid endoscopes allow good evaluation of the bronchial tree  
(D) Lavage and collection of cytology and culture samples is rarely needed to make a diagnosis
2. Diagnosis of which of the following diseases would NOT be possible on gross endoscopy?  
(A) Tracheal collapse

- (B) Bronchial foreign body  
(C) Bacterial pneumonia  
(D) *Oslerus osleri*

3. Which of the following orientations of the bronchial tree is correct?  
(A) The right and left mainstem bronchi divide symmetrically to the left and right cranial and caudal lobes  
(B) On reaching the tracheal bifurcation the left side is usually straight ahead  
(C) The right middle and accessory lobe bronchi cannot be seen endoscopically  
(D) The right and left mainstem bronchi divide to reveal the cranial and caudal lobes, with the right side having both a middle and accessory lobe

## Thoracic imaging picture quiz: is it cardiac or respiratory?

Kieran Borgeat

### THE SIX-WORD CARDIOLOGY TEXTBOOK

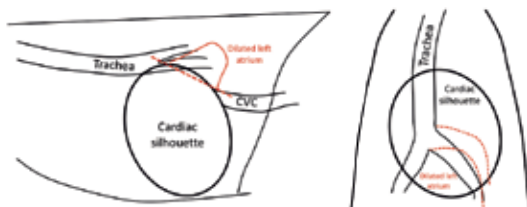
It has been said that the six-word cardiology textbook states, 'How big is the left atrium?' Although this oversimplifies the differentiation of cardiac from respiratory causes of dyspnoea or cough, measuring left atrial size can be used as a barometer of risk, to identify patients who are likely to have haemodynamically significant heart disease. Obviously, this only works for left-sided cardiac disease – right-sided disease in isolation will not cause left atrial dilatation, but can generate pleural effusions or significantly reduce cardiac output, mimicking respiratory disease by causing tachypnoea or exercise intolerance.

### THORACIC RADIOGRAPHY: RELIABLE WAYS TO FIND THE LEFT ATRIUM

Thoracic radiographs should be evaluated from close up and then further away; the '6-inches and 6-feet' approach. This minimizes the risk of missing significant abnormalities.

To identify left-sided congestive heart failure, the clinician must pick out three concurrent abnormalities: left atrial dilation, pulmonary infiltrates (alveolar or interstitial) and pulmonary venous distension. Without all three, congestive heart failure is uncertain. With only one of these detected, left-sided heart failure seems unlikely.

Reliably detecting left atrial dilatation on thoracic radiographs is difficult to consistently perform with confidence. My advice: identify the dorsal border of the caudal vena cava, and the point where it intersects the



**Figure 1:** Identifying the left atrium on thoracic radiographs: lateral projection (left) and dorsoventral projection (right). In lateral projection, the left atrium protrudes above an imaginary line between the caudal vena cava and the tracheal bifurcation. In dorsoventral, the bronchi are split further apart – the cowboy legs signs

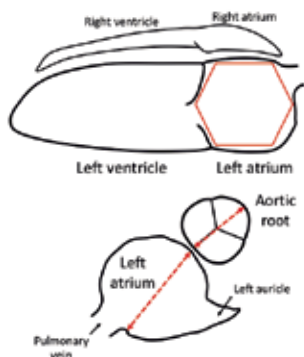
cardiac silhouette. Then identify the bifurcation of the trachea. Next, draw an imaginary line between these points; none of the cardiac silhouette should protrude above this line if the left atrium is normal size. If there is any cardiac silhouette visible above this line, it is left atrial dilatation (Figure 1).

In a dorsoventral view, the left atrium sits between the left and right principal bronchi. The angle between the bronchi should be approximately 60 degrees in normal dogs. When left atrial dilatation occurs, the bronchi are split wider apart, more like 90 degrees. This is affectionately known as the 'cowboy legs' sign.

### THE BASICS OF LEFT ATRIAL SIZE ASSESSMENT ON ECHOCARDIOGRAPHY

Echocardiography is a skill which takes longer to acquire than radiography, but offers advantages over radiographs in that cardiac structure and function can be assessed in realtime, and left atrial dilatation is more sensitively detected. In long-axis, the left atrium is relatively angular (square or hexagonal) and the left atrial area fits roughly twice into the left ventricular area. In short-axis, the left atrial diameter is no more than 1.5–1.6 times the diameter of the aortic root (Figure 2).





**Figure 2:** Subjective measurement of left atrial size on echocardiographic long-axis (left) and short-axis (right) views

### KEY LEARNING OBJECTIVES

- Identify the position of normal anatomical structures on thoracic radiography with confidence
- Find the left atrium on echocardiography and subjectively estimate its size in comparison to other cardiac structures
- Gain confidence in differentiating cardiac from respiratory disease in dogs and cats based on imaging findings

### MULTIPLE CHOICE QUESTIONS

1. In a dorsoventral radiograph, where is the body of the left atrium located?
  - (A) Between the mainstem bronchi, over the heart
  - (B) At 2–3 o'clock position on the cardiac silhouette
  - (C) Centrally, at the level of the fourth–fifth intercostal space
  - (D) At 1–2 o'clock position on the cardiac silhouette
2. On physical examination, what is a key clinical finding more suggestive of respiratory disease than cardiac disease?
  - (A) The absence of a heart murmur
  - (B) Muffled lung sounds ventrally
  - (C) Respiratory sinus arrhythmia
  - (D) Ventricular premature complexes
3. The severity of dynamic airway disease in dogs is best assessed using which imaging method?
  - (A) Echocardiography
  - (B) Bronchoscopy
  - (C) Radiography
  - (D) Fluoroscopy

## The punctured pet: dealing with thoracic bite wounds/stick injuries

**Georga Karbe**

Puncture wounds commonly are the result of animal bites or penetrating foreign bodies. This talk will focus on the steps involved in assessing these patients using case examples. Surgical intervention as well as postoperative management will be discussed.

Bite wounds result in puncture wounds in addition to varying degrees of crushed tissues. The externally visible wounds frequently underestimate the true extent of the injury and are often called the 'tip of the iceberg'. Tissue devitalization occurs secondary to crushing. Declaration of devitalized tissues is often delayed until 12–48 hours (or longer) after injury. Penetrating stick injuries or impalement injuries of the thorax are seen in dogs after playing with sticks or running through wooded areas. Sticks pushed deep into the tissues may not be visible externally.

Patients can present in various stages of shock and respiratory compromise. Physical examination must be performed upon presentation and should be repeated at

regular intervals. Patients may initially present in a stable condition but can quickly decompensate. Heart rate, respiratory rate and pattern, pulse quality, mucous membrane colour, capillary refill time, temperature, non-invasive blood pressure and pulse oximeter readings will help guide the treatment plan. Intravenous fluid resuscitation and analgesia should be started based on patient status, as well as oxygen supplementation if respiratory compromise is evident. Broad-spectrum antimicrobials should be administered early in the treatment course.

Early identification of penetration into the thorax, resulting in pneumothorax, haemothorax, pleural effusion or pulmonary injury is critical. Emergency drainage of air, blood or fluid from the pleural space may be required. Wounds should be covered with sterile dressings and addressed once the patient has been stabilized and fully assessed. Wounds sucking air need to be sealed and the air drained. Patients must be monitored for the development of tension pneumothorax. If a penetrating foreign body is known to have violated the pleural space, it should not be removed until the patient is under general anaesthesia, intubated and positive pressure ventilation available. Sticks may splinter or break upon entry into the body. Wound probing alone is often insufficient and wide surgical exploration is recommended to increase the chance of removing all stick debris. Imaging of the thorax and abdomen are performed to identify cavity injuries. Bacterial contamination from the bite or penetrating foreign body is expected, therefore timely surgical exploration, lavage, collection of a culture samples and drain placement are recommended.

# Cardiorespiratory

Patients are managed postoperatively with broad-spectrum antimicrobials (altered based on culture results), analgesia, intravenous fluid therapy as well as thoracic drainage. Drains can be removed once no air is drained for 12–24 hours or fluid production decreases to 2–3 ml/kg/24h.

## KEY LEARNING OBJECTIVES

- Assessment and stabilization of the punctured patient
- Surgical treatment of penetrating thoracic wounds
- Postoperative management of the punctured patient

## MULTIPLE CHOICE QUESTIONS

1. What common concurrent tissue damage is expected with bite wounds?  
(A) Crush  
(B) Burn

- (C) Laceration
- (D) Abrasion

2. How long after a bite is the full extent of tissue damage apparent?  
(A) Immediately  
(B) 1–6 hours after injury  
(C) 6–12 hours after injury  
(D) 12–48 hours after injury
3. Which of the following is recommended when dealing with penetrating thoracic wounds?  
(A) The foreign body should be removed immediately after injury  
(B) The foreign body should be removed as soon as the patient has received analgesia  
(C) The foreign body should be removed once the patient is intubated with positive pressure ventilation available  
(D) The foreign body should be removed once the patient has been assessed as stable

## Top tips on chest drain placement

### Georgia Karbe

This presentation will review the practical placement techniques of different thoracic drains. The exact location of where the drain should be placed depends on the condition that these drains aim to treat (air vs. fluid). In general, drains should enter the thoracic cavity in the ninth intercostal space and should be aimed from dorsally to ventrally. Care must be taken to aim away from the heart and major vasculature, the drain should run between the rib cage and lungs.

Large-bore drains on a blunt-tip or sharp trocar must be placed carefully to avoid iatrogenic damage to intrathoracic structures. Prior to placement, the drain should be premeasured against the body wall from its planned insertion point toward the second rib. The trocar can be used to tunnel under the skin and latissimus dorsi muscle spanning two intercostal spaces toward the seventh to ninth intercostal space, where it can then be gently 'popped' or twisted through the intercostal muscles. Once the drain has entered the thoracic cavity, the trocar should be drawn back slightly while the drain is advanced into its final position. Forcefully 'popping' the drain into the thorax is contraindicated as it carries a high risk of iatrogenic damage. Alternatively, a large curved artery forceps can be used to create the tunnel and then bluntly open a window into the intercostal muscles through which the drain can then be advanced. This method allows potentially more air to enter the thorax during placement, however it decreased the risk for iatrogenic trauma. Large-bore drains must be

secured in place with a friction knot technique ('Roman sandal' or 'Chinese finger trap') to prevent inadvertent drain removal.

Low-profile drains can be placed using a Seldinger technique. This technique eliminates the need for a tissue tunnel and therefore causes less tissue trauma. A large-gauge catheter is directly introduced into the ninth intercostal space. Once the needle has been removed from the catheter, a guide wire is passed through the catheter into the thorax. While maintaining the position of the wire, the catheter is drawn back over the wire. The drain is then threaded over the wire and advanced into the thorax. Once the drain is in the appropriate position, the wire is removed. Low-profile drains are sutured in place with the provided attachment equipment.

After drain placement, orthogonal thoracic radiographs are acquired to assess drain placement. The drain is also aspirated to remove air/fluid and to confirm functionality.

## KEY LEARNING OBJECTIVES

- Basic steps involved in chest drain placement
- Deciding which type of thoracic drain to place
- Assessing proper chest drain placement

## MULTIPLE CHOICE QUESTIONS

1. Where should chest drains enter the thoracic cavity?  
(A) Fifth to seventh intercostal space  
(B) Seventh to ninth intercostal space  
(C) Tenth to twelfth intercostal space  
(D) Second intercostal space

2. To where should the chest drain be aimed?

(A) Fifth rib  
(B) Seventh rib  
(C) Second rib  
(D) Ninth rib

3. What is the name of the technique by which a chest drain is placed with the use of a guide wire?

(A) Seldinger technique  
(B) Slatter technique  
(C) Salter Harris technique  
(D) Soft wire technique

## Top tips on thoracic cytology

### Kathleen Tennant

Thoracic cytology encompasses airway washes, pleural and pericardial fluids and aspirates of intracavitary lesions or organs.

Ideally, washes should be checked for cellularity before the animal is recovered – crystal clear, colourless fluids from a tracheal wash or bronchoalveolar lavage (BAL) do not often yield adequately cellular samples. The expected populations from the different areas should be contrasted to the cells on the slide – don't forget that macrophages are a normal part of the lower airway population.

Inflammatory cells can be categorized in a 200 cell differential, usually excluding the epithelial cells present. Organisms should be actively sought if inflammation is present. Bacteria must be demonstrated inside neutrophils to confirm bacterial sepsis – particularly important in these sample types as oropharyngeal contamination of the sample is not uncommon. The presence of the bacterium *Simonsiella* is a good indicator that this has taken place – culture results should be interpreted with caution. Background mucus and the presence of Curshmann's spirals can also add information. Do not exclude the possibility of parasitic processes just because neutrophils are the dominant cell type.

Neoplastic processes are less common, but both lymphoma and carcinoma can be found on washes.

Pleural and pericardial fluids can also be assessed for inflammatory causes. Blood in haemorrhagic pericardial fluids as well as infectious agents, repeat drainage or merely the chronic presence of fluid can spark reactive changes in mesothelial cells which mimic neoplasia.

Lung aspirates require confident imaging and sampling skills, but on occasion allow identification of masses which have not yet exfoliated into the pleural space or broken through into airways.

Cranial thoracic masses can also be challenging – lymphoma and thymoma are amongst the commonest findings here, but cystic structures and heart-base tumours can also occur. Some of these (e.g. chemodectomas) can

yield quite delicate cells and the smears should be made with a light hand.

### KEY LEARNING OBJECTIVES

- Recognize the best ways to obtain good-quality samples from airway washes and other thoracic cytology samples
- Appreciate some of the limitations of thoracic cytology
- Screen samples for inflammatory or neoplastic processes

### MULTIPLE CHOICE QUESTIONS

1. Which of the following is a normal finding on tracheal washes?
  - (A) 20% of cells being neutrophils
  - (B) Small cuboidal epithelial cells
  - (C) Ciliated columnar epithelial cells
  - (D) Squamous epithelial cells
2. Which of the following is true of thymoma cytology?
  - (A) The dominant cell type should be spindle-shaped cells with criteria for malignancy
  - (B) Mast cells can routinely be found scattered in thymoma smears
  - (C) >90% of the cells should be large lymphoid
  - (D) Thymomas do not exfoliate well and cytology should always be avoided
3. Which of the following is true of cytology in *Angiostrongylus* infection?
  - (A) Neutrophilic inflammation instead of eosinophilic inflammation rules out an *Angiostrongylus* infection
  - (B) *Angiostrongylus* eggs (which appear similar to those of *Capillaria*) have to be demonstrated in airway washes to diagnose infections
  - (C) *Angiostrongylus* larvae are approximately five times neutrophil size in length
  - (D) *Angiostrongylus* can, on occasion, be diagnosed on faecal smears

## Diagnosis and medical management of pyothorax

Simon Tappin

Pyothorax is the accumulation of exudate within the pleural space caused by the presence of an infectious agent, and has been documented after thoracic trauma, migrating foreign bodies, extension of pulmonary abscesses and haematogenous spread from a distant focus. It is, however, unusual to document the underlying cause. When no obvious underlying aetiology can be found, the migration of inhaled grass awns is often suspected.

Animals with pyothorax will present with signs associated with the presence of fluid in the pleural space, most commonly this is bilateral, but may be unilateral or asymmetric in distribution. The presence of the fluid leads to a restrictive or choppy breathing pattern, and leads to an absence of breath sounds ventrally on auscultation and dullness on thoracic percussion. The presence of a large-volume infection within the pleural space may also be associated with signs of sepsis and associated hypotension and pyrexia. Diagnosis is usually made on the basis of documenting the presence of fluid within the pleural space, either on ultrasonography or radiography and then collecting a sample via thoracocentesis. Analysis of this fluid will confirm the presence of an exudate with a high number of degenerate neutrophils and bacteria.

The treatment options for the management of pyothorax include a wide range of medical and surgical techniques and there is much debate as to which treatment option is best. In general, the placement of a chest drain to remove the accumulated exudate is needed, followed by lavage and long-term antibiotics. Where underlying thoracic pathology is present (e.g. a pulmonary abscess), early explorative surgery is indicated to remove the underlying focus of infection. Once the chest drain is in place, it allows continued drainage of exudate and lavage of the pleural space by the instillation of sterile saline. Whilst the benefits of thoracic lavage are controversial, logically, there would seem to be some benefits of lavage to aid the removal of purulent material from the pleural space. However a published study suggested that the one-off drainage of pyothorax via a chest tube, followed by its removal and then long-term antibiotics resulted in a good clinical outcome in all cases treated.

Systemic antibiotics should be continued for 6–8 weeks or 2 weeks after the resolution of clinical and radiographic signs. Many types of bacteria have been implicated in pyothorax and a mixed culture is most commonly

found with *Escherichia coli*, *Actinomyces* and *Nocardia* being amongst the most commonly cultured organisms.

Cultures are a useful guide to antibiotic choice, however anaerobic bacteria are hard to culture and negative cultures are possible due to prior antibiotic use. Broad-spectrum antibiotic combinations to cover both anaerobic and aerobic bacteria are indicated, such as co-amoxiclav and metronidazole or a fluoroquinolone with either metronidazole or clindamycin.

With appropriate treatment, the long-term prognosis of uncomplicated pyothorax is good. Survival past 48 hours is a significant prognostic indicator, with most dogs making a recovery from this point.

### KEY LEARNING OBJECTIVES

- Thoracocentesis is a safe technique to enable fluid collection from the pleural space enabling a diagnosis of pyothorax
- Chest drainage is needed to remove exudate from the pleural space, however the benefit of lavage is not well documented
- Mixed bacterial infections are commonly encountered and combinations of antibiotics are needed to cover both aerobic and anaerobic components

### MULTIPLE CHOICE QUESTIONS

1. Which of the following is NOT consistent with the presence of pyothorax?
  - (A) Large numbers of degenerate neutrophils
  - (B) Presence of sulphur granules in the effusion
  - (C) A protein level of 30 g/l
  - (D) Large numbers of medium-sized lymphocytes
2. Which of the following statements about chest drain placement for the management of pyothorax is correct?
  - (A) A chest drain is always needed for the management of pyothorax
  - (B) Instillation of antibiotics via the chest drain improves the prognosis
  - (C) Lavage of the chest with saline has been shown to definitively improve outcome
  - (D) A chest drain can be uncomfortable, especially if the pleura is inflamed
3. Which of the following antibiotic combinations would NOT be appropriate for the treatment of pyothorax?
  - (A) Co-amoxiclav and metronidazole
  - (B) Fluoroquinolone and clindamycin
  - (C) Fluoroquinolone and metronidazole
  - (D) Doxycycline and co-amoxiclav

# Diagnosis and surgical management of pyothorax

Georgia Karbe

This presentation will focus on surgical intervention and postoperative management for the treatment of pyothorax. The most common bacteria species isolated from patients with pyothorax include anaerobes *Bacterioides*, *Fusobacterium*, *Peptostreptococcus* and aerobes *Actinomyces* and *Pasteurella*, as well as *Escherichia coli*, *Klebsiella* and *Streptococcus*. Patients can present with a variety of clinical signs, ranging from vague lethargy and exercise intolerance, to severe respiratory distress, collapse or septic shock. Emergency stabilization includes oxygen supplementation, minimal stress and intravenous fluid therapy based on the patient's cardiovascular status. Timely initiation of medical management, including broad-spectrum antimicrobials, drainage of pleural effusion, thoracic lavage and supportive care, is recommended.

Surgical intervention is undertaken in patients where 3–7 days of medical management has been unsuccessful. Early surgical exploration is, however, indicated in patients with a known underlying condition, such as a foreign body or lung lobe abscess. Presurgical imaging, particularly thoracic computed tomography, can provide vital information regarding the source and location of infection and guide the surgical exploration. Thorough exploration of the entire thoracic cavity is essential for successful surgical treatment. This can be performed via median sternotomy or thoracoscopy. The pleural lining along the thoracic wall and diaphragm must be examined as well as the mediastinum and all lung lobes. Necrotic and infected tissues along the thoracic wall or mediastinum must be debrided. Pulmonary abscesses are removed via partial or complete lung lobectomy. Removed tissues are submitted for tissue culture and histopathology. Prior to closure, the entire thoracic cavity is thoroughly lavaged and thoracic drains are placed.

Postoperative management consists of continued medical management including antimicrobials (adjusted

based on culture results), fluid therapy and monitoring thoracic fluid production. Thoracic drains should be emptied every 2–4 hours initially and this can then be decreased to every 6–8 hours based on the amount of fluid drained. Fluid production is expected to decrease, and thoracic drains can be removed once fluid production reaches 2–3 ml/kg/24h. Cell count and cytology of the thoracic fluid should be monitored to ensure that the infection is resolving. Persistence of high fluid production, high cell count and evidence of intracellular bacteria on cytology suggest that the nidus has not been fully removed or that antimicrobial therapy must be altered. Reported success rates for treatment of pyothorax range from 48–86%.

## KEY LEARNING OBJECTIVES

- Stabilization of the pyothorax patient
- Surgical exploration of the thoracic cavity
- Postoperative care of the pyothorax patient

## MULTIPLE CHOICE QUESTIONS

1. Via what approach can the thoracic cavity be explored?  
(A) Laparotomy  
(B) Coeliotomy  
(C) Sternotomy  
(D) Craniotomy
2. Which of the following is NOT a criterion for when thoracic drains can be removed?  
(A) Fluid production decreases to 2–3 ml/kg/day  
(B) Fluid cell count decreases  
(C) Fluid production increases  
(D) Fluid cytology shows no intracellular bacteria
3. How frequently should thoracic drains should be emptied initially after surgery?  
(A) Every 2–4 hours  
(B) Every 24 hours  
(C) Only if the patient shows respiratory signs  
(D) No drains are needed after surgical treatment of pyothorax



Saturday 6 April  
Hall 6

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# Shelter medicine

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- 130 08:30–09:15  
**Caring for pets of homeless people**  
Jenny Stavisky
- 130 09:25–10:10  
**A pragmatic approach to dog diarrhoea in the shelter environment**  
Jenny Stavisky
- 131 11:05–11:50  
**Prepubertal neutering: a pragmatic approach**  
David Yates
- 132 12:00–12:45  
**A pragmatic approach to the skinny old cat in the shelter environment**  
Rachel Dean



# Caring for pets of homeless people

Jenny Stavisky

This session is aimed at those currently working with homeless peoples' pets, and also those who may be interested in becoming involved in this type of work. It will cover some background issues around homelessness and pet ownership, and an update on clinical aspects of veterinary care for homeless people's pets.

The UK has a long history of providing charitable veterinary care, and also of recognizing that homeless pet owners may benefit from extra support from within the veterinary profession. The Hope Scheme was set up around 30 years ago, and is currently funded and run by Dogs Trust. Over recent years, there has been an explosion of interest in this special population of people and pets within the veterinary professions. This corresponds with a 200% increase in homelessness in the UK since 2011, as the impact of the economic crisis and changes in governmental policies have been felt. One 2017 survey showed that over 4700 people sleep rough in the UK every night, and this is likely to represent a significant underestimate. In addition to rough sleepers, there are much larger numbers of 'hidden homeless', living in temporary accommodation such as hostels, bed and breakfasts and sofa surfing. Owners may have problems such as drug or alcohol addiction, mental health problems, be fleeing spousal abuse or simply have fallen on hard times. An estimated 9% of the population of England has been homeless at some point in their lives. How many of these are pet owners is not known, but in one USA study 23% of homeless people owned a pet.

For homeless people, owning a pet likely fulfils a similar role to anyone else who owns a pet – companionship, protection, feeling needed. These functions may be heightened in homeless people, who are at increased risk

of loneliness, social isolation and physical and psychological vulnerability. At the same time, pet ownership can be a barrier to accessing services such as housing. Accessing medical care or rehabilitation services may be deferred due to a lack of alternative care for the pet.

For those providing veterinary care to such pets, the initial impression is often surprise at how well cared for these animals are. Indeed, overweight or obese pets are more commonly seen than underweight patients. Where access to veterinary care has been previously unavailable, providing basics such as vaccination and endo- and ectoparasiticide treatment is often extremely helpful. Proof of this treatment (e.g. a vaccine card) may be especially useful as an indicator of responsible ownership when the client is seeking accommodation.

As Staffordshire Bull Terriers are overwhelmingly the most common pet seen, breed-related problems such as atopy and cruciate disease are likely to be relatively regular clinical presentations. Where problems are identified which require inpatient veterinary treatment, the feasibility of providing a good standard of care during recovery is an essential consideration. Preliminary data shows that separation-related distress is likely to be common within these animals, and this must also be taken into account when considering whether hospitalization is an option.

## KEY LEARNING OBJECTIVES

- Homelessness is a broad term which encompasses more than rough sleeping, and can include those living in squats, tents, hostels and other temporary accommodation
- For many homeless pet owners, their animal is an important family member, and they may find it hard to agree to treatments which involve them being separated from their pet
- In general, most homeless people's pets are very well cared for. However, they may be unused to being away from their owners and experience significant separation-related distress. This must be taken into account when treatment is proposed

# A pragmatic approach to dog diarrhoea in the shelter environment

Jenny Stavisky

This session will address three of the main challenges when encountering diarrhoea in dog shelters:

- Prevention and management of outbreaks of diarrhoea, including canine parvovirus
- Tips for cost-effective work-ups of individual cases
- Rehoming dogs with potentially zoonotic infections

When considering prevention of any infectious disease in a shelter environment, it is essential to first take a

full history and physical examination where the shelter itself is the patient. Understanding key management practices can enable evaluation of where the risk of introducing and transmitting infection can be reduced. Questions should include:

- Consideration of intake policies (where dogs come from; how they are transported; open/controlled intake)
- Cleaning and biosecurity protocols (presence of a protocol; training of staff and volunteers; management of separate risk groups, e.g. new intake/puppies; use of cleaning and disinfectant materials; whether practice matches protocol)
- Preventive medicine protocols (which dogs are vaccinated, if any; how soon after entry to the shelter vaccines are given; management of puppies and adolescent dogs)

The World Health Organization defines an outbreak as the occurrence of cases of a disease in excess of what

is expected. Therefore, under some circumstances, a single case may be treated as an outbreak, and lead to the implementation of more intensive biocontainment protocols. This is especially true in a disease such as parvovirus, which is very contagious and persists in the environment for long periods.

Treatment of individual cases of parvovirus generally focuses on barrier nursing, excellent nursing care and symptomatic treatment, including early enteral nutrition. Antibacterials are usually used due to the degree of compromise of the gut mucosa. Interferon has been shown to improve outcomes if used early in disease, but is unlikely to be cost effective in a shelter environment. The use of oseltamivir (Tamiflu) has been explored but evidence for its efficacy is poor. Given its intended human use, it is difficult to recommend it without further evidence.

Containment of an outbreak requires careful tracing of routes of introduction and transmission. Following an outbreak, it is important to evaluate whether existing protocols and training were as effective as possible, or whether improvements can be made.

When considering other types of diarrhoea, untangling the role of potential pathogens can be complex. In-house tests, such as faecal flotation, are relatively insensitive but quick and cheap to perform. Many organisms, including *Campylobacter*, *Giardia* and *Salmonella* (the latter especially in dogs fed raw meat), can be present as part of normal gut flora, so definitively identifying them as causative becomes problematic. Heavy, pure growths of these bacteria in the absence of other obvious causes may be significant. Treatment in some cases may be indicated, but serial faecal samples to prove elimination of infection are usually unhelpful, as infection may persist long beyond clinical cure.

Prospective adopters should be informed when dogs have had a potentially zoonotic pathogen identified. However, in the author's experience, once owners are reminded that all faeces contain potential pathogens, and should not therefore be ingested, this rarely poses a barrier to adoption.

## KEY LEARNING OBJECTIVES

- A full history and physical examination where the shelter is the patient are key to preventing infectious disease problems, and to managing them when they occur
- Where necessary, vaccines may be used off-licence as one component of infectious disease management within a shelter. Precedent can be found in both the WSAVA and ASV (Association of Shelter Veterinarians) guidelines
- In-house microscopy can be a cheap and quick method to rule in (but not rule out!) pathogens such as *Giardia*

## MULTIPLE CHOICE QUESTIONS

1. What may a shelter vaccine protocol include?
  - (A) Dogs which are stressed
  - (B) Dogs already showing signs of concurrent illness, e.g. pyrexia, cough
  - (C) Puppies from 4 weeks
  - (D) All of the above
2. Which of the following is a poor prognostic indicator in canine parvovirus infections?
  - (A) Faecal polymerase chain reaction (PCR) showing high viral load
  - (B) Very low neutrophil count
  - (C) High albumin:globulin ratio
  - (D) Very high neutrophil count
3. Which of these organisms is unlikely to be found in the faeces of a clinically normal dog?
  - (A) Canine coronavirus
  - (B) Canine parvovirus
  - (C) *Campylobacter upsaliensis*
  - (D) *Clostridium perfringens*

# Prepubertal neutering: a pragmatic approach

David Yates

In the UK, the two most common reasons for dog and cat entry into an animal shelter are relinquishment by an owner and as a stray animal. Neutering is often endorsed by animal welfare organizations to control pet overpopulation, limit oversupply and discourage casual pet acquisition. It is hoped that the procedure may have some preventive impact on future shelter intake.

Various factors may influence the neutering policy of the shelter, e.g. finance, facilities, throughput and veterinary advice. Some shelters may not enforce neutering before adoption. Others may have a veterinary suite and neuter at the centre. Animals may also be transported to nearby veterinary practices. Neutering

vouchers may be issued to owners at the time of adoption and redeemed after the pet has settled into their new environment.

Neutering before adoption from a shelter optimizes population control. Other methods have attrition rates, e.g. vouchers are often difficult to administer and owner compliance may be problematic.

Prepubertal neutering is the optimal surgical method of population control. It is applicable in a number of settings:

- Client-owned animals especially charity practice
- Shelter animals before adoption
- Trap and neuter schemes

With a few specific considerations, prepubertal neutering can be accomplished by most practitioners in a variety of settings. Anaesthesia may be improved by using body surface area dosing and preventing patient hypothermia and hypoglycaemia. Surgical success may be delivered by meticulous haemostasis. Prepubertal patients display more rapid and complete recoveries than

# Shelter medicine

their adult counterparts. The procedure carries a lower morbidity rate than adult gonadectomy.

The long-term effects of prepubertal gonadectomy in the cat are likely to be similar to those of conventional gonadectomy. For example, many vets would neuter an owned kitten at around 5–6 months. On the other hand, prepubertal gonadectomy of such a kitten may be carried out at second vaccination. This 2–3-month time difference is unlikely to be of significance to the individual, but is of enormous benefit in eliminating the possibility of unplanned breeding.

Uncontrolled and unplanned dog breeding is less likely than in the cat. Puberty may be much later in large and giant breeds. Dogs are less likely to live an outdoor lifestyle and have unfettered access to a receptive mate. A successful mating must coincide with an infrequent 'heat'. For these reasons, the need for prepubertal gonadectomy is less evident in the dog. Furthermore, there may be more significant differences between prepubertal and postpubertal neutered giant breeds of dog. For example, growth plate closure is delayed in animals neutered before puberty.

A balance must be found between the risks and benefits of gonadectomy to the individual pet and the need to improve the welfare of the tens of thousands of relinquished animals entering UK shelters each year.

## KEY LEARNING OBJECTIVES

- In an ideal world, all pets would be responsibly owned. Annually, UK shelters receive over 200,000 dogs and cats – most are relinquished or stray
- Prepubertal neutering is a simple procedure in dogs and cats which optimizes population control
- The case for prepubertal gonadectomy is highly persuasive in the cat. There are some important differences to consider in the dog

## MULTIPLE CHOICE QUESTIONS

1. Which of the following statements regarding anaesthesia of prepubertal puppies and kittens is NOT true?
  - (A) Hypothermia may be a significant cause of prolonged anaesthetic recovery
  - (B) The risk of hypoglycaemia may be reduced by prompt feeding on recovery
  - (C) Anaesthetic overdose is more likely using datasheet recommendations in young patients
  - (D) Body surface area dosing improves the reliability of alpha-2 adrenoreceptor agonists/ketamine combinations in kittens
2. Which of the following most accurately describes dog and cat reproduction in the UK?
  - (A) Most cat breeding is planned and few litters are unwanted
  - (B) Unplanned dog pregnancies are frequently discovered at routine gonadectomy
  - (C) Shelters have capacity to receive unwanted kittens because the breeding problem is non-seasonal
  - (D) Many pet owners are unaware of the reproductive capacity of their pets
3. Which one of the following statements is FALSE?
  - (A) Neutering generally increases life expectancy in the dog and cat
  - (B) Neutering before puberty will cause stunted growth in some dog breeds
  - (C) Prepubertal gonadectomy may increase the risk of some forms of cancer in dogs
  - (D) Prepubertal gonadectomy may decrease the risk of some forms of cancer in dogs

## A pragmatic approach to the skinny old cat in the shelter environment

Rachel Dean

Investigating medical conditions of animals in shelters has some unique challenges. There is often an unknown, uncertain or very short clinical history. In addition, the person who presents the cat to you may not be the person who cares for the cat or is responsible for the bill. Any demand on resources, in terms of time, money or people for the old cat presented to you may affect the rest of the shelter population. It is important to establish the ethos of the organization, whether the aim is to rehome the individual, and what their euthanasia policy is, to make sure everyone has a clear understanding of what is and is

not possible for each case. Like all decisions in the shelter environment, a degree of pragmatism and 'herd health' thinking is needed!

Weight loss and/or poor body condition in elderly cats is a common presentation and a feature of many different conditions. It is important to take a stepwise pragmatic approach to each individual case, considering the possible prognosis and treatment options prior to undertaking potentially expensive diagnostic tests.

As with all cases the investigation starts with the clinical history and physical examination, including body weight (ideally to two decimal places) and body condition score. Even if the time the cat has been with the shelter is very short (sometimes it is a matter of hours!), taking a thorough history is important and attention should be paid to appetite, diet, thirst, mobility, behaviour, demeanour, urine and faeces, and coat condition. Similarly a complete physical examination is required, with particular attention to the mouth, eyes, cervical region, thorax, abdomen and musculoskeletal system (basically the whole cat!). If the cat is very new to the shelter and/or there are no significant abnormalities on clinical examination, it may be able to use the 'test of time' and ask for the cat to be observed for a short period

before proceeding. It is vital to know how much (and if!) a cat is eating before pursuing any investigations.

Ideally diagnostic investigations should be done consecutively so that one test is used to inform another and ensure no tests are done unnecessarily which will waste the budget and time. Which test to do first should be driven by the clinical history and physical examination, and the right order will vary from one patient to the next. It is vital to only undertake a test if it will change what you do. It is important to remember expensive tests are not always the best tests, in-house tests are not always cheaper, urinalysis can teach you a lot, a treatment trial can sometimes be a useful part of the investigation and you do not always have to treat everything you find!

Case examples from shelters will be given in the lecture to demonstrate some of these approaches to a number of common diseases.

### KEY LEARNING OBJECTIVES

- Describe the key challenges of dealing with elderly feline patients in the shelter environment
- Calculate nutritional requirements for feline patients
- Create a stepwise investigation plan for a skinny old cat in a shelter

### MULTIPLE CHOICE QUESTIONS

1. What is the best calculation for estimating the calorie requirement of a cat under 2 kg?  
(A)  $70 \times (\text{current body weight in kilograms})^{0.75}$   
(B)  $(30 \times \text{current bodyweight in kilograms}) + 70$   
(C)  $(50 \times \text{current bodyweight in kilograms}) + 60$   
(D)  $50 \times (\text{current body weight in kilograms})^{0.75}$
2. What urine specific gravity would suggest a hydrated skinny feline patient may have a degree of chronic kidney disease?  
(A) 1.060                      (C) 1.040  
(B) 1.050                      (D) 1.030
3. Which blood biochemistry findings would increase the suspicion of hyperthyroidism in a skinny cat?  
(A) Increased alanine aminotransferase (ALT) and decreased creatinine  
(B) Increased alkaline phosphatase (ALP) and decreased urea  
(C) Increased creatinine and decreased albumen  
(D) Increased cholesterol and decreased ALT



Saturday 6 April  
Hall 6

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# AVP

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- 136 14:05–14:50  
**Ophthalmological manifestation of systemic disease**  
Ben Blacklock
- 137 15:00–15:45  
**Cardiac manifestations of systemic disease**  
Ruth Willis
- 138 16:50–17:35  
**Management of refractory epilepsy**  
Jeremy Rose
- 139 17:45–18:30  
**Acute kidney injury: practical management**  
David Walker

# Ophthalmological manifestation of systemic disease

**Ben Blacklock**

Ophthalmological assessment of patients suffering from systemic disease can be very useful in narrowing differential lists, targeting investigations and monitoring responses to therapy. The eye is unique in that nowhere else in the body can the central nervous system (optic nerve head) and the peripheral vasculature (retinal blood vessels) be directly visualized. Furthermore, the very high rate of ocular blood flow means there is an increased likelihood of the uveal and retinal vasculature being exposed to haematogenous neoplastic cells and/or infectious organisms.

The list of systemic diseases with possible ocular manifestations is extensive, and more information can be found in ophthalmology textbooks. As a result only the most common or interesting diseases are mentioned here.

## UVEITIS

Uveitis is inflammation of the uveal tract (iris, ciliary body and/or choroid), which is the vascular tunic of the eye. Uveitis may be triggered by a long list of diseases (including infectious, inflammatory, metabolic, toxic and several miscellaneous diseases), but an underlying cause is not found in a significant number of cases (i.e. idiopathic or immune-mediated uveitis). Because the eye is limited in its ability to respond to injury, different diseases may produce similar clinical signs.

In a study at North Carolina State University of dogs presenting with uveitis, which had undergone a complete diagnostic work-up, 58% of cases were idiopathic/immune-mediated. Neoplasia was diagnosed in 24.5% of dogs (lymphosarcoma the most common cancer, in 17 of 25 cases). Infectious diseases were found in 17.6% of cases (ehrlichiosis the most common, in 7 of 18 cases).

In cats, there is less information available, but a 1991 histopathological study found that in cats with a confirmed cause of uveitis, feline infectious peritonitis and feline leukaemia virus (FeLV)-associated lymphosarcoma were the most common aetiologies.

## FELINE VIRAL DISEASE

- Feline herpesvirus type 1 (FHV-1) – causes upper respiratory tract disease (URTD) and conjunctivitis and/or keratitis
- Feline calicivirus (FCV) – causes URTD, oral mucosal ulceration and ocular surface disease (primarily conjunctivitis – typically mild)
- Feline immunodeficiency virus (FIV) – ocular disease is typically chronic anterior uveitis and conjunctivitis, and FIV is associated with lymphosarcoma in cats
- FeLV – primarily causes ocular disease through the induction of lymphosarcoma; with sites of ocular lymphosarcoma including the uveal tract, conjunctiva and orbit

- Feline infectious peritonitis (FIP) – ocular signs more common with non-effusive (dry) form, often associated with vasculitis, and include pyogranulomatous anterior uveitis, fibrin in the anterior chamber, keratic precipitates and choroidoretinitis (with retinal detachment and perivascular cuffing)

## DIABETES MELLITUS

The majority of dogs with diabetes will develop cataracts (75% within a year of diagnosis). Furthermore, diabetic dogs have a relatively high chance of developing retinal haemorrhages and microaneurysms, and tend to have lower tear production than non-diabetic dogs.

## HYPERTHYROIDISM/SYSTEMIC HYPERTENSION

The eye is a major target organ for systemic hypertension, with the most common lesions being retinal blood vessel tortuosity, focal retinal oedema, bullous retinal detachment and retinal haemorrhage. If untreated, total retinal detachment and intravitreal haemorrhage may develop. The ocular changes seen in hyperthyroid patients are likely to be due to systemic hypertension.

## KEY LEARNING OBJECTIVES

- To understand why the eye is affected in many systemic disease processes
- To recognize uveitis and understand it is the ocular manifestation of many systemic diseases
- To recognize ocular signs of selected other more common systemic diseases, such as diabetes mellitus and systemic hypertension

## MULTIPLE CHOICE QUESTIONS

1. Why should examination of the eye be part of a clinical examination when investigating systemic disease?
  - (A) Because quality of life of the patient will be severely impaired if they go blind
  - (B) Because many systemic diseases have pathognomonic ocular signs that will provide a diagnosis
  - (C) Because the eye is the only place in the body where the central nervous system (optic nerve head) and the peripheral vasculature (retinal blood vessels) be directly visualized
  - (D) Because there is a very limited number of systemic diseases that may cause ocular signs
2. Regarding the aetiology of canine uveitis, which of the following is true?
  - (A) Idiopathic/immune-mediated uveitis make up the majority of cases, followed by neoplasia and then infectious diseases
  - (B) Neoplasia is the most common cause of uveitis, followed by infectious diseases and then idiopathic/immune-mediated
  - (C) Infectious diseases are the most common cause of uveitis, followed by idiopathic/immune-mediated and then neoplasia



- (D) Idiopathic/immune-mediated uveitis make up the majority of cases, followed by infectious diseases and then neoplasia
3. Regarding the ocular effects of diabetes mellitus in canine patients, which of the following is true?
- (A) The majority of dogs will develop cataracts within a year of diagnosis

- (B) Diabetic dogs have a higher incidence of retinal haemorrhages and microaneurysms than non-diabetic dogs
- (C) Diabetic dogs tend to have lower tear production than non-diabetic dogs
- (D) All of the above are true

## Cardiac manifestations of systemic disease

Ruth Willis

As the 'engine' of the body, the heart is susceptible to the effects of disease elsewhere. The response of the heart may be appropriate – for example sinus tachycardia in response to pain or hypovolaemia. However, in other situations the effect of systemic disease on the heart may result in worsening haemodynamics and a specific therapeutic intervention may be required. Whilst numerous systemic diseases will affect the heart, this lecture will highlight the more common conditions.

### ELECTROLYTE ABNORMALITIES

Conditions resulting in severe electrolyte imbalances can affect the heart. For example, in dogs with hypoadrenocorticism at the time of an Addisonian crisis, there is profound hypovolaemia and also multiple electrolyte imbalances, such as hyperkalaemia, often resulting in bradyarrhythmias that are potentially life-threatening. Specific anti-arrhythmic treatment is rarely required and treatment is directed at aggressively addressing the effects of mineralocorticoid and glucocorticoid deficiency.

### VENTRICULAR TACHYARRHYTHMIAS

Ventricular arrhythmias are common in association with severe systemic disease. The pathophysiology is likely to be multifactorial and includes myocardial hypoxia and ischaemia, acid-base disturbances, microthrombi formation and the effects of inflammatory mediators.

Common conditions associated with ventricular arrhythmias include:

- Splenic disease, especially haemangiosarcoma
- Gastric dilatation–volvulus (GDV)
- Immune-mediated haemolytic anaemia
- Immune-mediated thrombocytopenia
- Pancreatitis

In some cases the ventricular arrhythmia is haemodynamically stable and resolves spontaneously with treatment of the underlying disease. Ventricular arrhythmias are more likely to require treatment if:

- The rate is fast (>180 bpm)
- Predisposing factors, such as pain, hypovolaemia and electrolyte imbalances, have been appropriately managed and the arrhythmia persists
- There is systemic hypotension

Anti-arrhythmic treatment of ventricular tachyarrhythmias often involves the use of lidocaine as bolus(es) followed by a continuous rate infusion.

### LEFT VENTRICULAR HYPERTROPHY IN CATS

Cats commonly exhibit cardiac adaptations to systemic disease. For example left ventricular concentric wall hypertrophy is seen in cats with:

- Hyperthyroidism
- Systemic hypertension (for example renal disease, hyperaldosteronism)
- Acromegaly

### PULMONARY HYPERTENSION

Non-cardiac conditions that may result in pulmonary hypertension include:

- Parasitism (for example *Dirofilaria*, *Angiostrongylus*)
- Chronic pulmonary disease (for example interstitial pulmonary fibrosis)
- Pulmonary vascular disease with proliferative change affecting the vessel walls
- Pulmonary thromboembolism secondary to systemic illness

Pulmonary hypertension may be diagnosed non-invasively using spectral Doppler echocardiography to measure the velocity of pulmonic (PI) and/or tricuspid (TR) insufficiency jets. PI >2.2 m/s and TR >2.8 m/s are suggestive of pulmonary hypertension. In dogs pulmonary hypertension can often be ameliorated using sildenafil.

### VAGOTONIA

Some conditions will increase parasympathetic tone, especially gastrointestinal disease, respiratory disease and conditions resulting in significant increases in intracranial pressure. These conditions augment parasympathetic tone and can increase the likelihood of neurally mediated syncope.

### KEY LEARNING OBJECTIVES

- Give examples of systemic diseases likely to result in arrhythmias
- Give examples of systemic disease likely to result in left ventricular hypertrophy in cats
- Understand that treatment of malignant ventricular arrhythmias usually involves administration of intravenous lidocaine

## MULTIPLE CHOICE QUESTIONS

- When may increased parasympathetic tone be seen in dogs?
  - Hypovolaemia
  - Chronic respiratory disease
  - Phaeochromocytoma
  - Anaemia
- When may left ventricular concentric hypertrophy be seen in cats?

- Inflammatory bowel disease
  - Pancreatitis
  - Hyperthyroidism
  - Hypovolaemia
- What is ventricular tachycardia causing systemic hypotension commonly treated with?
    - Intravenous lidocaine
    - Intravenous diltiazem
    - Oral digoxin
    - Oral atenolol

# Management of refractory epilepsy

Jeremy Rose

Refractory epilepsy occurs when seizures do not respond adequately to medication, or when the side effects caused by medication result in a poor quality of life for the patient. Refractory epilepsy is very common in small animal practice and managing these cases can be challenging. Effective management revolves around five main steps:

- Establishing the patient has refractory epilepsy
- Ensuring the episodes are epileptic seizures
- Re-evaluating the patient to identify reasons for becoming refractory to treatment
- Considering the anti-seizure regimen and alternative treatments
- Resetting expectations

Many owners feel isolated and panicked whilst looking after seizing patients. They also report that many of the side effects of anti-seizure drugs, such as sleeping more and ataxia, affect their pet's quality of life. As such, owners are prone to present their epileptic pet as refractory to the practitioner. It is important to educate owners on the expectations of treatment and collectively establish what is considered refractory for their pet so they can contact you for advice in this instance. As epilepsy often progresses with time, the definition of refractory for a particular patient is fluid. It is important to re-establish markers for being refractory to treatment so you can manage these patients effectively long term.

Once you have established your patient is refractory to treatment it is important to review their history and examination. This includes a full neurological examination and description (or in some cases videos) of the episodes. Many other paroxysmal episodes can resemble seizures and sometimes treatments may have started before full characterization of the episodes was possible. Repeat history and examination may identify a deterioration in cases of structural epilepsy or even change your differentials so a previously presumptive idiopathic epileptic is now considered to have a structural cause. This may lead to further investigations or treatments other than anti-seizure drugs.

Where changes to the anti-seizure drug regimen are considered, it is important to check owner compliance.

Following this, repeating bloods and checking serum levels of the medications allows optimization of a monotherapy before another drug is used or added to the current treatment plan. Selecting another anti-seizure drug can be challenging but considering the potential efficacy alongside mechanism of action, pharmacokinetics, side effects and costs will help with the decision-making process. Diet changes can help aid seizure control for some patients but there is no evidence supporting the use of other treatments (e.g. transcranial magnetic stimulation, the use of essential fatty acids, and vagal nerve stimulators) in veterinary patients at this time. Alternative therapeutics may gather evidence with time and become options for helping you manage these refractory patients in the future.

## KEY LEARNING OBJECTIVES

- Develop guidelines to describe an individual as having refractory epilepsy
- Evaluate a patient to determine reasons for being refractory to treatment
- Choose additional anti-seizure drugs for a refractory patient

## MULTIPLE CHOICE QUESTIONS

- Autoantibodies to which channels have been found in some cats with limbic encephalitis?
  - Ligand-gated chloride channels
  - Ligand-gated sodium channels
  - Voltage-gated calcium channels
  - Voltage-gated potassium channels
- Which of the following findings on neurological examination would indicate a left-sided forebrain lesion?
  - A horizontal nystagmus with fast phase to the right
  - Absence of the right-sided pupillary light reflex on direct or indirect testing
  - Left-sided head tilt
  - Right-sided menace response deficit
- Which anti-seizure drug is proposed to act on the SV2A protein?
 

(A) Imepitoin	(C) Phenobarbital
(B) Levetiracetam	(D) Potassium bromide

# Acute kidney injury: practical management

**David Walker**

Treatment goals for the patient with acute kidney injury (AKI) are aimed at limiting further renal damage and enhancing cellular recovery. Correction of fluid, electrolyte and acid–base disorders, achieving and maintaining normotension, and establishing/maintaining urine flow are the most important aspects of therapy in patients presenting with AKI.

## FLUID THERAPY

The most effective therapy in patients with AKI is careful management of fluid balance. Even in the absence of clinically detectable dehydration, a 5% fluid deficit should be suspected and the dehydration deficit should be corrected over 4–6 hours; only then can urine output be accurately assessed. The rate of crystalloid fluid administration after correction of dehydration should take into account insensible losses, sensible losses and urine output. Insensible losses (fluid lost with respiration and normal stools alone) are typically estimated as 22 ml/kg/day, and sensible losses from vomiting and dehydration need to be estimated. Urine output (UOP), which is also a sensible loss, is most reliably monitored by placing an indwelling urinary catheter but it can be estimated by measuring free-catch samples every time a patient urinates and/or by weighing soiled bedding. The urinary catheter should be aseptically placed and connected to a closed collection system because animals with AKI have depressed immunity to infection.

In terms of the crystalloid fluid of choice, a balanced polyionic solution (i.e. lactated Ringer's solution (LRS)) is appropriate in most situations. It is imperative to avoid volume overload in patients with AKI as this has repeatedly been shown to worsen outcome because it does not increase renal oxygen delivery despite improved cardiac output and renal blood flow. The 'ins-and-outs' method of fluid administration helps maintain an appropriate fluid balance by matching the volume administered to the volume excreted. Anuric patients should receive fluids to replace insensible losses only. If the patient is overhydrated, then insensible losses should be withheld. Overhydration in an anuric patient, or an inability to induce diuresis in an oliguric or anuric patient, is an indication for continuous renal replacement therapy (CRRT), which is the only other effective therapeutic option.

## OLIGURIA AND ANURIA

Various values for urine output have been used to define oliguria, including <0.25 ml/kg/h, <0.5 ml/kg/h, and

<1–2 ml/kg/h. The author typically uses a value of <1 ml/kg/h to define oliguria. Anuria is defined as essentially no urine production. If pathological oliguria or anuria persist despite correction of fluid deficits, diuresis should be considered to increase urine production.

Furosemide is a loop diuretic; it can increase urine flow but has no effect on glomerular filtration rate (GFR) or renal blood flow. An initial furosemide bolus is given intravenously in oliguric patients. An increase in urine output should be seen within 20–60 minutes of intravenous administration. If a response is seen, furosemide therapy can be repeated every 8 hours or continued as a continuous rate infusion (CRI).

Mannitol is an osmotic diuretic that promotes natriuresis and will increase renal blood flow due to its intravascular volume-expanding effects. GFR may be improved with mannitol therapy due to its renal vasodilator effects, and increased tubular blood flow may be beneficial in flushing tubular obstructions caused by casts and cellular debris. Additionally, mannitol has free-radical-scavenging properties and is thought to reduce cellular swelling. Mannitol should be given as an initial intravenous bolus over 3–5 minutes. Diuresis should occur within 20–30 minutes and mannitol can be continued as a CRI.

## KEY LEARNING OBJECTIVES

- Understand how to differentiate acute kidney injury (AKI) from chronic kidney disease (CKD)
- Understand the 'ins-and-outs' method of fluid administration
- Be aware of when and how to use diuretics in dogs with AKI

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is the most appropriate fluid choice in a dog presenting with AKI?
  - (A) Hetastarch
  - (B) Hypertonic saline (7%)
  - (C) Lactated Ringer's solution (LRS)
  - (D) Saline (0.45%)
2. Which of the following would be the most appropriate first-choice diuretic agent in an anuric dog with AKI?
  - (A) Dopamine
  - (B) Fenoldopam
  - (C) Furosemide
  - (D) Mannitol
3. Which of the following would be an indication for renal replacement therapy in a dog with AKI?
  - (A) Hypotension
  - (B) Intractable hyperkalaemia
  - (C) Underhydration
  - (D) Polyuria



Saturday 6 April  
Hall 8

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# Imaging

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- 142 08:30–09:15  
**Is this a bone tumour? Differentiating benign and malignant bone disease with radiographs**  
Jennifer Kinns
- 143 09:25–10:10  
**A waste of time? Should we still be doing skull radiographs in 2019?**  
Jennifer Kinns
- 144 11:05–11:50  
**Is this elbow dysplasia? What radiographs tell us and when to use CT**  
Francisco Llabrés Díaz
- 145 12:00–12:45  
**From head to tail, imaging the neurological patient: when are radiographs still useful?**  
Francisco Llabrés Díaz
- 146 14:05–14:50  
**Now, your turn: interactive orthopaedic film reading**  
Jennifer Kinns
- 146 15:00–15:45  
**Now, your turn: interactive head and neck film reading**  
Raquel Salguero
- 147 16:50–17:35  
**Orthopaedic weird and wonderful: an interactive radiographic journey**  
Jennifer Kinns
- 147 17:45–18:30  
**Now your turn: interactive spine film reading**  
Francisco Llabrés Díaz

## Is this a bone tumour? Differentiating benign and malignant bone disease with radiographs

Jennifer Kinns

Radiographs are an important part of the work-up of skeletal lesions in small animal patients. The differentiation between benign and malignant bone disease determines the next steps in clinical work-up and case management.

There are four key Roentgen findings that are associated with aggressive bone lesions: the presence of cortical destruction, a long zone of transition between normal and abnormal bone, an aggressive form of periosteal reaction and an aggressive form of lysis (bone loss). Aggressive lesions are frequently lytic, but whether the lesion is primarily lytic or proliferative does not in itself determine if the lesion is aggressive. Not all features of aggressive bone disease may be present in a lesion, and some benign lesions may share features of a more aggressive process.

Cortical destruction is often identified in aggressive lesions, and if present is a good indicator of an aggressive lesion. It is only seen on radiographs if the affected cortex is projected tangentially by the X-ray beam. At least two views of a lesion will increase the chances of visualizing this. In a benign process the cortex can be expanded without destruction.

Bone lysis is not evident radiographically until there is a 30% loss of bone density, and early primarily destructive lesions can therefore be very subtle. The pattern of bone lysis has been related to the character of aggressive bone lesions. Moth-eaten and permeative lysis are associated with aggressive lesions whereas geographic (well defined, regional) lysis can occur with benign lesions, such as bone cysts. However, some aggressive lesions will also display a more geographic form of lysis and this distinction alone is not adequate to differentiate benign and aggressive disease. Multiple myeloma and synovial cell sarcoma for example can also have very well defined more focal lytic lesions.

Periosteal reaction also varies in characteristic between benign and aggressive forms. Aggressive lesions have a more active periosteal reaction which is irregular. Benign lesions tend to have smooth margins and good definition. The rate of change of periosteal reaction can also help differentiate benign from aggressive lesions. More aggressive lesions progress more rapidly.

The transition zone describes the junction between normal and abnormal bone. This is longer and less well defined with aggressive disease, whereas a benign lesion may have a distinct sclerotic margin.

The aetiology and location of the lesion affects the radiographic appearance of aggressive disease. Joint-associated neoplasia, such as synovial cell sarcoma, is characterized by punctate lysis affecting multiple bones with minimal periosteal reaction. Lesions of the spine are often more lytic than proliferative and multiple myeloma typically appears as multifocal lytic lesions without periosteal involvement. Primary osteosarcoma of the appendicular skeleton typically displays all the features of aggressive disease, but can be quite variable. It frequently occurs in predilection sites within the metaphyseal region (proximal humerus, distal radius, distal femur and proximal tibia), while metastatic lesions can occur anywhere.

There is marked variation in appearance depending on the stage of disease. Early osteosarcoma can be very subtle with faint periosteal reaction, but will typically progress rapidly. Histopathology is the gold standard for diagnosis, but if cost, patient factors or client choice are prohibitive, follow-up radiographs can be used to assess for progression in the lesion that would be expected with aggressive disease.

This lecture will discuss the radiographic features of benign and aggressive bone disease using case examples.

### KEY LEARNING OBJECTIVES

- Recognize the radiographic features of aggressive bone disease
- Differentiate benign from malignant bone lesions more easily
- Recognize the characteristic features of some common bone malignancies

### MULTIPLE CHOICE QUESTIONS

1. What is the characteristic radiographic feature of an aggressive periosteal reaction?  
(A) A sunburst shape  
(B) Pallasading appearance  
(C) Irregular margin  
(D) Elevation from the cortical surface
2. What is the predilection zone for osteosarcoma?  
(A) Diaphyseal  
(B) Epiphyseal  
(C) Metaphyseal  
(D) Mixed epiphyseal and metaphyseal
3. Which part of the skeleton is most commonly affected by multiple myeloma?  
(A) Spine and pelvis  
(B) Long bones  
(C) Carpi and tarsi  
(D) Skull

# A waste of time? Should we still be doing skull radiographs in 2019?

**Jennifer Kinns**

Skull radiographs are difficult to perform well, and are difficult to interpret. The question arises as to whether we should take them at all when other modalities, particularly computed tomography (CT), may better answer the clinical question. They can be a waste of time if interpretation is limited by poor positioning and an inadequate choice of views. However, not every clinic has access to CT, not every pet is insured and not every owner can afford to pay for a CT study. Done well, skull radiographs can answer important clinical questions that will impact the planning and prognosis for the patient. The short answer to the question title is, 'Yes, some of us should still be doing skull radiographs for some cases.' This lecture will outline how to take a diagnostic study of the skull, using case examples. It will also review the limitations of skull radiographs and when CT may be necessary.

General anaesthesia is almost always necessary to acquire a diagnostic study of the skull. The anatomical complexity requires very accurate and standardized positioning which is not possible in a conscious patient. A minimum number of views is necessary for a diagnostic study. Dorsoventral (DV) and lateral views are indicated in almost every case. The DV view is preferred to the ventrodorsal (VD) view as it is easier to obtain mandibular symmetry. Additional views will be required depending on the clinical presentation. These are summarized in Figure 1.

In general practice, skull radiographs can help identify the presence of aggressive osseous lesions in patients presenting with mass lesions. Although the extent of disease may not be accurately assessed, this could allow

the owner and clinician to make a decision as to the next appropriate step, such as biopsy and thoracic radiographs or potentially euthanasia. Radiographs can also help identify the presence of middle ear disease, and in trauma patient's skull radiographs can be used to identify osseous trauma. In most cases requiring surgical intervention, advanced imaging, such as CT, will be necessary for more accurate assessment and surgical planning.

## KEY LEARNING OBJECTIVES

- Recognize the clinical indications for skull radiography
- Understand the appropriate views and correct positioning for different clinical indications
- Understand when computed tomography of the skull is necessary

## MULTIPLE CHOICE QUESTIONS

1. Which view is indicated for assessment of the tympanic cavities in addition to standard DV and lateral images?
  - (A) Intraoral dorsoventral
  - (B) Open-mouth rostrocaudal
  - (C) Open-mouth ventrostral-dorsocaudal
  - (D) None of the above
2. If you acquire an open-mouth left 20-degree dorsal-right ventral radiograph of the skull, which structure will be projected ventrally?
  - (A) Left mandible
  - (B) Right mandible
  - (C) Left maxilla
  - (D) Right maxilla
3. Which anatomical structure will have to be elevated to produce a straight lateral projection of the canine skull?
  - (A) Base of the skull
  - (B) Neck
  - (C) Nose
  - (D) Ears

Region of concern	Radiographic projections indicated
Middle ear/tympanic bullae	Open-mouth rostrocaudal; lateral oblique <sup>a</sup> (left rostral–right caudal for the right and right rostral–left caudal for the left); rostroventral-caudodorsal oblique
Nasal passages	Open-mouth rostroventro-caudodorsal oblique; intraoral dorsoventral
Frontal sinuses	Skyline/rostrocaudal frontal sinus view
Maxillary dental structures	Lateral oblique <sup>a</sup> (open-mouth left ventral to right dorsal for the right and open-mouth right ventral to left dorsal for the left)
Mandibular dental structures	Lateral oblique <sup>a</sup> (open-mouth left dorsal to right ventral for the right and open-mouth right dorsal to left ventral for the left)
Temporomandibular joints	Lateral oblique views as for tympanic bullae

**Figure 1:** Radiographic projections for the skull

<sup>a</sup>The lateral oblique views will be acquired at different angles depending on the skull type of the patient and the region of interest



## Is this elbow dysplasia? What radiographs tell us and when to use CT

**Francisco Llabrés Díaz**

There has been a very significant shift towards the use of CT when evaluating cases of suspected elbow dysplasia (ED). This is mostly well justified although radiography can still offer a financially viable and quick assessment at the time of the original clinical presentation and in chronic cases where a flare-up has occurred.

### RADIOGRAPHY

A three projection study of the elbow (neutral 110-degrees mediolateral, 45-degrees flexed mediolateral and a craniocaudal) is needed to evaluate this area. The BVA/KC scheme requires the first two as screening. The quality of the radiographs will have a very significant impact on the usefulness of the test. Particular care and training are needed at the time of obtaining the craniocaudal projections.

Radiographs will be able to detect:

- Conspicuous primary lesions
- Significant increase in opacity of the distal and caudal aspect of the ulnar notch (a useful radiographic sign of disease although difficult to detect if subtle and when evaluating poor-quality radiographs)
- Presence and severity/extension of osteoarthritis, useful as a baseline for monitoring

Radiographs will struggle (CT is here superior) to evaluate:

- The degree of incongruity, unless severe
- Subtle medial coronoid process alterations

### COMPUTED TOMOGRAPHY

#### Advantages

- Lack of superimposition
- Exquisite anatomical detail
- Therefore higher sensitivity for those lesions where radiography can struggle
- Although not part of the ED complex, CT is also superior in cases with incomplete ossification of the humeral condyle or stress fractures at this level, an important clinical consideration, particularly in spaniel breeds

#### Disadvantages

- Poor at detecting cartilage-only lesions
- It can be difficult to differentiate osteochondritis dissecans from kissing lesions
- Joint congruity is not assessed on weightbearing/overall range of motion

### Situations where CT shines over radiography

- The detection of mild/focal changes within the medial coronoid process
- Variable degrees of subchondral bone hypoattenuation
- Presence of fissures or small and minimally displaced fragments
- Presence of convincing but mild incongruity
- Hyperattenuation of the subchondral bone at the level of the distal/medial humeral condyle

The appearance of an ununited anconeal process and osteoarthritis will be the same as on radiographs.

### INTERPRETATION

The link between morphological alterations and their clinical relevance and, most importantly, therapy is still under debate. From experience, large detached or displaced medial coronoid process fragments and large ununited anconeal processes tend to be treated (arthroscopically or surgically) more promptly.

### KEY LEARNING OBJECTIVES

- Elbow dysplasia (ED) is a multifactorial disease with a high genetic influence and heritability, often bilateral, although not necessarily symmetrical
- Radiographs are used to detect visible (not always conspicuous) primary lesions and secondary osteoarthritic changes
- It is not wrong to recommend computed tomography (CT) with a strong clinical suspicion of ED to minimize the chances of an uncertain result, but CT should not be used as a screening tool in cases of obscure lameness

### MULTIPLE CHOICE QUESTIONS

1. Which one of the following findings is clinically relevant if radiographically testing for causes of elbow lameness?  
(A) Nutrient foramen  
(B) Open growth plates  
(C) Mach bands  
(D) Panosteitis
2. Which one of the following is NOT part of the elbow dysplasia complex?  
(A) Ununited anconeal process  
(B) Incomplete humeral condylar ossification  
(C) Osteochondrosis  
(D) Medial coronoid process fragmentation
3. At what age are dogs evaluated in the BVA/KC elbow dysplasia scheme?  
(A) Only less than 1 year old  
(B) Only if older than 1 year  
(C) Only younger than 2 years  
(D) No age restriction

# From head to tail, imaging the neurological patient: when are radiographs still useful?

**Francisco Llabrés Díaz**

## RADIOGRAPHY

It can be an ideal, quick and versatile technique:

- As part of a generic screening in cases of:
  - Suspected or known trauma
  - Suspected toxicity
  - Underlying neoplasia – staging
  - Metabolic or neuromuscular conditions (myasthenia gravis – megaesophagus, aspiration pneumonia, underlying thymic disease)
- In cases where post surgical monitoring following the use of implants is being carried out regularly

There is no need to therefore always defer to advanced imaging techniques when dealing with neurological presentations. Conversely, examples where other modalities can frequently detect earlier changes include: discospondylitis, spondylitis, physisitis and vertebral neoplasia. Radiography will not be generally recommended in cases with a clear suspicion of intracranial disease or neurocompression or for the detailed evaluation of vertebral or skull fractures.

## ULTRASONOGRAPHY

Ultrasonography is useful when survey imaging is to be performed, particularly with traumatic and oncological patients. It is also used for the diagnosis of portosystemic shunts and guided sampling.

## COMPUTED TOMOGRAPHY

Computed tomography (CT) is good for quick and detailed screenings. It is particularly useful, however, in those cases of trauma, for screening and also in those cases with a suspected or known skull or vertebral fractures (detailed fracture evaluation and clarification of the state of the neighbouring structures). CT will be quick and large haemorrhagic foci should be conspicuous through increased attenuation. In these cases, however, the evaluation of the brain and spinal cord parenchyma for oedema or contusions may be more difficult than with magnetic resonance imaging (MRI), particularly if the abnormalities are subtle and/or focal.

CT is also useful in chondrodystrophic breeds with an acute intervertebral disc extrusion, as the extruded material will frequently be mineralized. Conversely, it is accepted that non-mineralized disc material is likely to

need of CT myelography or MRI to be diagnosed. In addition, CT is more limited than MRI for evaluation of the spinal cord for contusions, oedema or malacia.

## MAGNETIC RESONANCE IMAGING

Although it is more often than not the modality of choice, the previous paragraphs have hopefully demonstrated that each neurological case should be treated individually and when MRI would be better. Cases with intracranial neurolocalizations or strong clinical suspicions of neurocompressive disease will benefit from undergoing MRI. The diagnosis of congenital malformations, vascular accidents, neoplasia, meningoencephalomyelitis or the detailed evaluation of the brain or spinal cord in cases of trauma are perfect examples of when MRI is preferred.

## KEY LEARNING OBJECTIVES

- If one subtracts financial factors as well as availability from the choice of imaging technique, the use of certain modalities can be strongly linked to the clinical presentation/need of therapeutic guidance, with advanced imaging then being frequently chosen
- Radiography can and should still play an important role
- Advanced imaging is recommended for the detailed evaluation of head trauma and cases with a very strong clinical suspicion of neurocompressive disease

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is correct in diagnosis of discospondylitis?
  - (A) Radiography will always detect alterations
  - (B) Radiography and clinical signs will always match their severity
  - (C) Can only be diagnosed radiographically if using myelography
  - (D) Radiographic signs can vary markedly during the acute and chronic phases
2. Which of the following is correct for intervertebral disc extrusion?
  - (A) Is always associated with significant spinal cord compression
  - (B) Can sometimes be diagnosed on plain CT
  - (C) Can always be diagnosed on plain radiographs
  - (D) Only needs the evaluation of the vertebral canal on imaging studies
3. Which of the following is correct concerning ventral vertebral periosteal reaction as a radiographic finding?
  - (A) Is always pathological
  - (B) Is frequently seen from T2 to T4
  - (C) Can be an indirect sign of neoplastic spread
  - (D) Can be a sign of intervertebral disc extrusion

# Imaging

## Now, your turn: interactive orthopaedic film reading

**Jennifer Kinns**

Radiographic interpretation can be an integral part of the work-up of small animal orthopaedic patients. This lecture will be a presentation of a series of interesting orthopaedic cases. The cases will include examples of developmental bone disease, radiographic evaluation of trauma and fracture healing, some examples of aggressive bone disease and examples of joint disease in canine and feline patients. It will be an interactive session, and delegates will be asked their opinion on the findings and diagnosis in these cases by means of electronic voting.

### KEY LEARNING OBJECTIVES

- Review some of the radiographic findings in common developmental orthopaedic conditions in canine patients
- Understand the need for additional views in some trauma patients with orthopaedic injury

- Review the radiographic findings in joint-associated disease

### MULTIPLE CHOICE QUESTIONS

1. Which additional view would be recommended in a patient suspected of having medial collateral tarsal instability?  
(A) Flexed lateral  
(B) Dorsoplantar oblique  
(C) Stressed dorsoplantar view  
(D) Flexed skyline projection
2. Which additional view could be used to help identify osteochondritis dissecans of the canine shoulder?  
(A) Lateral oblique  
(B) Supinated lateral  
(C) Skyline view of the intertubercular groove  
(D) Flexed craniocaudal
3. Which joints are most commonly affected by rheumatoid arthritis?  
(A) Carpus and tarsus  
(B) Elbows and stifles  
(C) Shoulders and hips  
(D) Stifles

## Now, your turn: interactive head and neck film reading

**Raquel Salgüero**

This interactive session will focus on the cases that are commonly seen in general practice that affect the head and neck. Pathologies of the head and neck are difficult to diagnose on radiographs as generally the normal anatomy is difficult to understand. Most of the times, advanced imaging techniques, such as computed tomography or magnetic resonance imaging are needed to achieve a definitive diagnosis. This will be a case-based session using turning point to help to identify normal anatomy in our patients and pathologies in dogs and cats.

### KEY LEARNING OBJECTIVES

- Understand the principles of interpretation of head and neck radiographs

- Identify the most common pathologies seen in veterinary practice that can be diagnosed with radiographs
- Understand which next steps in imaging should be used to help achieve a diagnosis

### MULTIPLE CHOICE QUESTIONS

1. Which are the most common tumours seen in the thyroid glands?  
(A) Lymphoma (C) Osteosarcoma  
(B) Carcinoma (D) Fibrosarcoma
2. Which is the best projection to evaluate the tympanic bullae in dogs?  
(A) R10° V-Cd DO  
(B) Lateral  
(C) Rostrocaudal with an open mouth  
(D) Ventro-dorsal
3. What is the most common finding in radiographs in cases of nasal aspergillosis?  
(A) Destructive rhinitis  
(B) Mass effect  
(C) Normal appearance  
(D) Bilateral increased opacity

# Orthopaedic weird and wonderful: an interactive radiographic journey

**Jennifer Kinns**

This lecture will be a presentation of a series of the more unusual orthopaedic cases. The cases will include examples of less common osseous and metastatic neoplasia, examples of fungal osteomyelitis, metabolic bone disease and congenital bone disease. It will be an interactive session, and delegates will be asked their opinion on the findings and diagnosis in these cases by means of electronic voting.

## KEY LEARNING OBJECTIVES

- Recognize some of the less common causes of aggressive bone disease

- Recognize some of the radiographic features of metabolic bone disease in small animals
- An introduction to the less common congenital bone diseases

## MULTIPLE CHOICE QUESTIONS

1. Which part of the bone is affected by mucopolysaccharidosis (type VI) in cats?  
(A) Epiphysis (C) Metaphysis  
(B) Diaphysis (D) All parts are affected
2. Which part of the long bones are most often affected by fungal infection?  
(A) Epiphysis  
(B) Diaphysis  
(C) Metaphysis  
(D) Cortices
3. Which bones are most typically affected by hypertrophic osteopathy?  
(A) Metacarpals and phalanges  
(B) Long bones  
(C) The vertebrae  
(D) The pelvis

# Now your turn: interactive spine film reading

**Francisco Llabrés Díaz**

Multiple clinical scenarios may benefit from imaging the vertebral column and/or the spinal cord. When considering vertebral or spinal imaging, however, the most likely underlying cause may not be particularly clear from the clinical presentation. The symptoms and chronicity or progression of the clinical signs will need to be considered when deciding on the imaging modality to recommend.

The general tendency is to move towards advanced imaging modalities to evaluate most of these cases, but plain radiography can still be very useful. Typical examples of this include:

- Trauma cases, where a survey of the areas suspected of having been damaged can be performed quickly and without great expense. Follow-up radiographs in cases of implant requiring surgery are also useful and routinely obtained
- Congenital malformations causing severe malangulation of the vertebral column and/or associated neurocompression through direct vertebral canal narrowing or indirect compression (associated secondary disc protrusion, for instance): some of these alterations may be associated with a dynamic component. This may be easier to test on radiography than with other imaging modalities

- Dyscospondylitis, physitis, spondylitis: although significant mismatches between the severity of the inflammatory process and the visible radiographic alterations may occur
- Metabolic conditions: secondary hyperparathyroidism, for instance, causing osteopaenia and potentially pathological fractures – more often described with nutritionally induced forms of the disease
- Neoplasia: detectable on plain radiography if there is significant bone alteration (can be lysis or new bone formation or a combination of both). Both primary and metastatic lesions can be detected, but not all cases of neoplasia will be associated with radiographic alterations

It is important to clarify that cases with a strong suspicion of intervertebral disc extrusion, ischaemic myelopathy, myelitis, epidural empyema or spinal cord neoplasia, to cite a few, are likely to benefit from advanced imaging sooner rather than later. In addition, if vertebral stabilization is to be performed following trauma, advanced imaging will offer a far more detailed evaluation of the affected vertebrae and the effect of the trauma on the geometry of the vertebral canal, to guide reconstruction.

## KEY LEARNING OBJECTIVES

- The clinical presentation, rather than the imaging modality per se, can give you a strong hint as to whether plain radiography is potentially useful in a case
- Whenever possible, magnetic resonance imaging (MRI) or computed tomography (CT)/CT myelography should be considered ahead of myelography

- Postoperative radiographs can be very useful as a baseline for future comparisons or follow-up studies in cases where implants have been used

## MULTIPLE CHOICE QUESTIONS

1. Which of the following statements about diagnosing spinal cord neoplasia is true?
  - (A) Radiography will always detect alterations
  - (B) Radiography will never detect alterations
  - (C) Spinal cord neoplasia can only be diagnosed radiographically in cases of metastases to the spinal cord
  - (D) Radiographs can help if the vertebral body is remodelled
2. Which of the following statements about atlanto-axial luxation is true?
  - (A) Is always associated with alterations on plain radiographs
  - (B) May need dynamic studies to confirm instability
  - (C) Can only be diagnosed on myelography
  - (D) Only needs the evaluation of the dens of the atlas on imaging studies
3. Which of the following statements about a young dog involved in a road traffic accident and presenting with signs suggestive of vertebral column/spinal cord trauma is true?
  - (A) Should always be evaluated by CT
  - (B) Should always have the thorax and abdomen evaluated regardless of the neurolocalization of the lesion
  - (C) Should be evaluated with CT myelography to assess the spinal cord
  - (D) Should always have the imaging findings correlated with the neurological status

Saturday 6 April  
Kingston Theatre

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# Loco-regional anaesthesia

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- 150 08:30–09:15  
**Basic LA plus pharmacology**  
Jaime Viscasillas
- 150 09:25–10:10  
**Local anaesthesia equipment**  
Matt Read
- 151 11:05–11:50  
**Local blocks in the head**  
Jaime Viscasillas
- 152 12:00–12:45  
**Thoracic limb local anaesthetic techniques**  
Matt Read
- 153 14:05–14:50  
**Epidural anaesthesia**  
Jaime Viscasillas
- 154 15:00–15:45  
**Pelvic limb local anaesthesia techniques**  
Matt Read
- 155 16:50–17:35  
**Abdominal and thoracic local anaesthesia techniques**  
Matt Read
- 156 17:45–18:30  
**LA and analgesia cases: interactive session**  
Matt Read and Jaime Viscasillas

# Loco-regional anaesthesia

## Basic LA plus pharmacology

**Jaime Viscasillas**

Lidocaine, bupivacaine, mepivacaine, procaine, ropivacaine, mepivacaine, levo-bupivacaine, ... we have many local anaesthetics available, so which one is the best? Which one should I buy? Which one should I use? Is the most expensive the best one? Fortunately, pharmacology will assist in answering every single question.

Initially, we need to understand the mechanism of action of local anaesthetics and why they are an excellent tool for pain management. Transmission of pain is carried out by means of action potentials transmitted along a nerve fibre. Local anaesthetics basically block this transmission, in a reversible way.

However, as with every drug we administer, we need to know their potential side effects plus how to avoid them, and what to do in case we encounter problems. Although it is possible to successfully treat systemic toxicity, it is undoubtedly better to avoid rather than treat complications.

The clinical decision of choosing one local anaesthetic over another one will be based on the specific clinical scenario. Do I need a local anaesthetic that works very fast? Is the surgery going to be very long? Which local anaesthetic technique am I going to use? Again, the answers to these questions are based on the pharmacology of local anaesthetics.

There are some concepts we need to remember, such as the molecular structure of local anaesthetics, pKa, solubility, potency, protein binding and concentration. Understanding these factors will help us decide which local anaesthetic is more suitable for each clinical scenario.

On top of the intrinsic factors related to the local anaesthetics, we can also combine them with other drugs in order to change or alter some of their characteristics. As a well known example, adrenaline is mixed with lidocaine to increase the duration of action of the local anaesthetic effect. Other drugs which are currently used

include bicarbonate, alpha-2 agonists, opioids or steroids. This session will outline the advantages and potential disadvantages of these combinations.

### KEY LEARNING OBJECTIVES

- To describe the mechanism of action of local anaesthetics
- To list the local anaesthetics we can use in small animals
- To recognize the main factors affecting the effect of local anaesthetics

### MULTIPLE CHOICE QUESTIONS

1. How does pyothorax alter the efficacy and drug choice when applying an intrapleural block?
  - (A) The tissue is infected so pH of the tissue will be acidotic and dissociation of local anaesthetics will be compromised
  - (B) The absorption of the local anaesthetic is delayed so the effect will last much longer than expected
  - (C) The effect will depend on the concentration of the local anaesthetic: high concentration of local anaesthetic will work
  - (D) Local anaesthetics with high solubility diffuse much better through the infected tissues therefore they are the right choice
2. Which drug administered with bupivacaine will NOT increase the duration of the block?
  - (A) Adrenaline
  - (B) Medetomidine
  - (C) Dexamethasone
  - (D) Buprenorphine
3. Which local anaesthetic is more likely to cause systemic reactions?
  - (A) Lidocaine
  - (B) Procaine
  - (C) Bupivacaine
  - (D) Levo-bupivacaine

## Local anaesthesia equipment

**Matt Read**

This session will introduce the learner to the equipment that is used to perform regional anaesthesia in small animals. The characteristics of specialized needles will be discussed as they relate to performance and safety of nerve blocks. The considerations for using nerve stimulation to confirm proximity of the needle to a peripheral nerve will be reviewed. The use of ultrasound for performance of peripheral nerve blocks will be introduced,

including the basics of 'knobology' (e.g. gain, depth, in-plane vs. out-of-plane needle approaches).

Many different types of needles can be used for local or regional anaesthesia. Needles are generally selected based on tip design, length, gauge, absence or presence of insulation and/or echogenic characteristics, and clinician preference depending on the size of the patient and the planned block. Each type has its own inherent advantages and disadvantages, depending on the block being performed.

The shape of the needle tip affects the operator's ability to appreciate the different tissue planes encountered as the needle is advanced into the patient during performance of the block. Hypodermic needles have long bevels and sharp edges and are not ideal for performing most peripheral nerve blocks. Blunt needles



(e.g. 30-degree or 45-degree bevels, Tuohy needles, etc.) are better choices for local and regional anaesthetic techniques where multiple tissue planes are expected to be penetrated. The blunt design of these needle tips influences the subjective 'feel' of tissue layers as the needle is advanced, giving the operator more information about needle location in the patient and lessening the chances of inadvertently penetrating a vessel or the nerve itself.

Peripheral nerve stimulators are used in conjunction with insulated needles and should be adjustable in terms of impulse frequency (Hz), pulse width (milliseconds) and current strength (milliamperes). Insulated needles are specifically designed for use with a peripheral nerve stimulator and are coated with a thin layer of non-conductive material over the length of the needle, except for a small exposed area at the needle tip. When connected to a peripheral nerve stimulator, the current is conducted down the shaft of the metal needle and is released at the tip. As the needle is advanced towards the nerve, the current that is released from the tip will stimulate the target nerve. When this occurs, the operator will see contractions (referred to as 'motor responses') in the muscles that are innervated by the target nerve, assuming the nerve is not strictly sensory in function. The output of the nerve stimulator should be able to be adjusted in small increments across the clinically useful range of 0.1 mA to 1.0 mA, allowing for close approximation of the needle-to-nerve distance.

Use of ultrasonography to perform nerve blocks is now considered to be the gold standard in people and it is increasingly being used in animals for this same purpose. The advantages of using ultrasonography over blind techniques (including nerve stimulation) is that it allows the operator to assess the patient's anatomy prior to needle placement, to visualize the target nerve and its location relative to other important structures (e.g. blood vessels, pleura, etc.), and to observe the local anaesthetic spreading around the nerve in real time as it is being injected, minimizing the chance for complications such as intravascular or intraneural injections.

## KEY LEARNING OBJECTIVES

- How the characteristics of a needle may affect performance of regional anaesthesia
- How nerve stimulation can be used to confirm proximity of a needle to the target nerve

- How to optimize an ultrasound image when regional anaesthesia is being performed

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is CORRECT concerning needle selection for regional anaesthesia with nerve stimulation?
  - (A) The use of an insulated needle does not affect block success
  - (B) A needle with a long-bevel allows for better 'feel' as anatomic structures are penetrated
  - (C) A sharp needle is less likely to traumatize the target nerve
  - (D) The presence of distance markers along the needle shaft can be helpful once the needle is *in situ*
2. When using nerve stimulation to perform a peripheral nerve block under ultrasound guidance, which of the following should you do?
  - (A) Connect the red lead to the patient, the black lead to the needle, set the frequency to 2 Hz, and set the current output to 5 ma
  - (B) Connect the black lead to the patient, the red lead to the needle, set the frequency to 2 Hz, and set the current output to 2 ma
  - (C) Connect the red lead to the patient, the black lead to the needle, set the frequency to 1 Hz, and set the current output to 0.5 ma
  - (D) Connect the black lead to the patient, the red lead to the needle, set the frequency to 1 Hz, and set the current output to 2 ma
3. When using ultrasound guidance to perform a nerve block, which of the following should you do?
  - (A) Use the gain controls to help position the target nerve in the center of the screen
  - (B) Orientate the needle so as to approach the nerve using as acute an angle as possible
  - (C) Use an in-plane technique to position the tip of the needle adjacent to the nerve
  - (D) Use a low-frequency probe to obtain the best resolution of the image

## Local blocks in the head

### Jaime Viscasillas

Many surgical procedures are performed in the head of small animals: dentals, eye surgery, ear surgery, rhinoscopy, etc. The knowledge of the anatomy of the head will give information about the innervation of this area and the nerve(s) we need to block in order to anaesthetize a specific region.

But why do we need to use local anaesthesia techniques for these procedures? The local anaesthetics will provide very good analgesia during the surgical procedures, therefore we will be able to decrease/avoid other drugs that potentially will cause hypotension (i.e. isoflurane during maintenance). Additionally, many dogs and cats coming for dental procedures will be geriatrics, therefore kidney or liver function can be altered. Providing excellent local analgesia will avoid the use of systemic drugs such as non-steroidal anti-inflammatory drugs (NSAIDs) or high doses of opioids which can compromise the recovery of the patient. Finally, the effect of local anaesthetics can last several hours into the postoperative period, therefore recovery will be smooth, pain free,

# Loco-regional anaesthesia

and potentially less analgesic drugs will be needed postoperatively.

Although head surgery is not as common as surgery to the rest of the body, many local blocks can be used. Several approaches have been described in the veterinary literature for nerve blocks, and knowledge of the anatomy of each specific patient will help us deciding which approach is most suitable. Additionally, the use of some tools, such as ultrasonography, can offer advantages in some patients.

In this lecture we will discuss and describe the use of different local blocks in the head, such as mental, inferior alveolar, infraorbital, maxillary, auriculotemporal, auriculopalpebral, great auricular nerve blocks and retrobulbar block. Most of these techniques are performed blindly and require simple and inexpensive equipment (just the local anaesthetic, a hypodermic needle and a syringe). We will also mention other simpler options for specific procedures, such as patients with brachycephalic obstructive airway syndrome (BOAS).

## KEY LEARNING OBJECTIVES

- To understand the anatomy of the head from an anaesthetist's point of view
- To list the main local anaesthesia techniques applicable to the head of dogs and cats

- To discuss the clinical scenarios where these techniques can be used

## MULTIPLE CHOICE QUESTIONS

1. Which block would you use to provide analgesia for a rhinoscopy?  
(A) Maxillary nerve block  
(B) Infraorbital nerve block  
(C) Alveolar inferior nerve block  
(D) Mental nerve block
2. How many approaches have been described for the maxillary nerve block?  
(A) 1  
(B) 2  
(C) 3  
(D) 4
3. Which nerve or nerves do you need to block in order to provide analgesia for a total ear canal ablation?  
(A) Auriculotemporal and auriculopalpebral nerve  
(B) Auriculotemporal and great auricular nerves  
(C) Auriculopalpebral and great auricular nerves  
(D) We cannot do any block for that surgery

# Thoracic limb local anaesthetic techniques

## Matt Read

This session will introduce the learner to the clinically relevant aspects of performing regional anaesthesia of the thoracic limb of small animals. Relevant anatomy will be reviewed and some of the newer techniques that are used to perform regional anaesthesia of the thoracic limb (e.g. brachial plexus blocks, RUMM blocks) will be discussed.

Many potentially invasive and painful surgical procedures are performed on the thoracic limb, making it important to be able to safely and effectively provide local and regional anaesthesia to this part of the body. In the past, blind approaches to the brachial plexus and other peripheral nerves of the limb were described, with varying levels of success despite the large volumes of drug that were recommended. Recently, development of techniques that use nerve stimulation and/or ultrasonography to perform nerve blocks have resulted in much higher success rates with relatively small volumes of local anaesthetic.

In terms of regional anaesthesia, the nerves of the distal limb that are most relevant to sensory and motor function are the musculocutaneous, radial, median and ulnar nerves. These main nerves (or their roots) can be

blocked using one of several different techniques using nerve stimulation and/or ultrasonography. Blind techniques are not usually associated with good success and are generally not recommended. Although nerve stimulation is still considered to be a blind technique, the ability to induce motor responses in target muscle groups (e.g. elbow flexion as a result of biceps muscle contraction resulting from musculocutaneous nerve stimulation) does allow the operator to assume some degree of needle-to-nerve proximity prior to injection of the local anaesthetic. Blocking the nerves in the brachial plexus using an axillary approach with nerve stimulation will typically result in anaesthesia of the thoracic limb distal to the humerus.

With ultrasonography, the individual nerves and associated blood vessels of the brachial plexus can be visualized, allowing the operator to position the needle tip adjacent to the target nerves without causing inadvertent injury to the patient. Visualizing the nerves also allows the operator to reposition the needle between injections instead of simply injecting a large volume at one location and hoping it reaches all of the nerves. This allows the local anaesthetic to be deposited more precisely and the volume of drug potentially to be lower than when blind techniques are used. Depending on the technique that is used, use of ultrasonography for performing a nerve block will typically result in anaesthesia of the thoracic limb distal to the scapula.

The radial, ulnar, median and musculocutaneous nerves can also be blocked at a more distal location, avoiding needle placement near the major vessels of the limb in the axilla. Although blind techniques at this

location result in variable efficacy, use of ultrasonography to visualize the nerves prior to injection can result in higher levels of success. Many people find a RUMM block easier to perform than a brachial plexus block due to the more superficial location of the target nerves and the distance of the nerves from other important structures. With ultrasonography, the individual nerves can be visualized proximal to the elbow on the lateral (R) and medial (UMM) sides of the limb, allowing the operator to position the needle tip adjacent to the target nerves. Performing a RUMM block will typically result in anaesthesia of the limb distal to the elbow, making it very useful for a range of commonly performed surgical procedures.

## KEY LEARNING OBJECTIVES

- Describe the anatomy that is considered relevant when performing peripheral nerve blocks of the thoracic limb
- Name two different regional anaesthetic techniques that can be used to provide anaesthesia and analgesia to the thoracic limb
- List the equipment and provide the name of a drug and the dose/volume that is required to perform each of these techniques

## MULTIPLE CHOICE QUESTIONS

1. Which of the following nerves are responsible for providing sensory innervation to the thoracic limb?

- (A) Suprascapular, subscapular, brachiocephalicus, radial and musculocutaneous
- (B) Suprascapular, subscapular, musculocutaneous, radial, axillary, medial and ulnar
- (C) Brachiocephalicus, suprascapular, musculocutaneous, radial, medial and ulnar
- (D) Musculocutaneous, radial, axillary, median and ulnar

2. Which of the following techniques could be used to provide anaesthesia for a radial fracture?

- (A) RUMM block
- (B) Sciatic nerve block
- (C) Intercostal nerve block
- (D) Transversus abdominis plane block

3. When approaching the radial nerve with a needle, which of the following would likely be the most difficult to perform?

- (A) Approaching the nerve from a lateral-to-medial direction
- (B) Approaching the nerve from a cranial-to-caudal direction
- (C) Approaching the nerve from a caudal-to-cranial direction
- (D) It does not matter since the nerve can be approached easily from any direction

# Epidural anaesthesia

## Jaime Viscasillas

Let's do an epidural! Easy! But ... which approach? Which drug? Which volume? Which concentration? Which equipment should I use? In which patients should I avoid the epidural route? Which side effects can I have and how can I avoid them? Single injection or epidural catheter? Where should I leave the tip of the catheter? How can I know if I am in the epidural space? The needle is in the subarachnoid space, what should I do?

As we know, the epidural route is one of the most effective ways to provide analgesia in our patients. In fact, in human anaesthesia it is the gold standard for many surgical procedures, so why is it less popular in veterinary anaesthesia? It can be used to control pain in surgical procedures, medical conditions, such as pancreatitis, or even chronic pain. Additionally, the epidural space runs from the head to the tail, so potentially it is a good route to treat pain in different locations, such as tail, hind limbs, abdomen, thorax and even neck. It is important to understand the anatomy of the epidural space to recognize the advantages/disadvantages of the

different approaches we can use to reach the epidural space.

The epidural technique is considered an easy technique to be performed in the majority of cases. The most reported/used approach is the lumbosacral approach, where we have a big 'window' to reach the epidural space. However, we could use other approaches (i.e. sacrococcygeal, between T13 and L1 vertebrae, etc.) once we have enough experience with the lumbosacral approach. It is important to appreciate different approaches since they can be used to provide analgesia to specific areas or for when the lumbar approach is not an option (i.e. obesity, dermatitis, etc.).

We need to try to clarify all these questions and get the most out of the epidural analgesia for our patients.

## KEY LEARNING OBJECTIVES

- To discuss the different factors which need to be taken into account when performing an epidural technique
- To summarize the potential side effects and what to do if they happen
- To describe potential clinical uses of epidural anaesthesia

# Loco-regional anaesthesia

## MULTIPLE CHOICE QUESTIONS

1. Which are the main differences between spinal (subarachnoid) and epidural anaesthesia?
  - (A) Spinal anaesthesia has a faster onset of action, is more potent but does not last as long as epidural injection
  - (B) In dogs and cats the dural sac ends at the level of L7
  - (C) The volume of the drug administered in the epidural space must be half of the one administered in the subarachnoid space
  - (D) Epidural anaesthesia is contraindicated in patients with obesity and abnormal anatomy
2. At which level would you put the tip of an epidural catheter in order to control pain in severe pancreatitis if local anaesthetics are going to be used?
  - (A) It does not matter
  - (B) At any point between L5 and L7
  - (C) At any point between T3 and T5
  - (D) At any point between T12 and L1
3. Which technique is currently not recommended to confirm the correct position of the tip of the needle inside the epidural space?
  - (A) Ultrasonography
  - (B) Lack of resistance to injection of air
  - (C) Lack of resistance to injection of saline
  - (D) Neurostimulation

## Pelvic limb local anaesthesia techniques

### Matt Read

This session will introduce the learner to the clinically relevant aspects of performing regional anaesthesia of the pelvic limb of small animals. Relevant anatomy will be reviewed and some of the newer techniques used to perform regional anaesthesia of the pelvic limb (e.g. femoral nerve block, saphenous nerve block, sciatic nerve block) will be discussed.

Many potentially invasive and painful surgical procedures are performed on the pelvic limb, making it important to be able to provide local and regional anaesthesia safely and effectively to this part of the body. Innervation to the pelvic limb is provided primarily by the femoral and sciatic nerves, although the obturator and other nerves may also contribute some sensory function in some patients. The femoral nerve can be blocked at a proximal location as it courses through the psoas muscle or at a more distal location as it passes through the inguinal region alongside the femoral artery and vein. The sciatic nerve can be blocked anywhere along its course, but is most commonly blocked using nerve stimulation as it runs between the greater trochanter of the femur and the ischiatic tuberosity, or using ultrasonography as it runs distally down the limb, deep to the biceps femoris muscle.

Although blind approaches to blocking the femoral and sciatic nerves have been described, they generally result in low levels of success despite the large volumes of drug being injected. As a result, they have not been widely adopted by practitioners to any degree and epidural or spinal anaesthesia currently remain the most common techniques for providing anaesthesia and analgesia to the pelvic limb. However, over the past 10 years, a number of different techniques for performing femoral and sciatic nerve block using nerve stimulation and/or

ultrasonography have been reported. Ultrasonography can easily be used to visualize the individual nerves of the pelvic limb, allowing the operator to position the needle tip adjacent to the target nerves. Visualizing the nerves also allows the operator to reposition the needle between injections instead of simply injecting a large volume at one location and hoping it reaches all of the nerves. Depending on the technique that is used, ultrasound-guided blocks typically result in anaesthesia of the pelvic limb distal to the mid-femur, making these techniques useful for a range of commonly performed surgical procedures.

Although most people think about the femoral nerve when considering the innervation of the pelvic limb, its sensory component, the saphenous nerve, is becoming much more relevant to regional anaesthesia as a result of us being able to visualize the nerve with ultrasonography. An important factor when considering how to perform a saphenous nerve block is the fact that the saphenous nerve is strictly sensory in function. As such, it is not possible to elicit a motor response when using nerve stimulation so it is impossible to approximate needle-to-nerve distance unless ultrasonography is used. For this reason, landmark-based approaches to blocking this nerve have generally been unsuccessful. Now that we can use ultrasonography to visualize the saphenous nerve and position the needle close to it, we can use this technique as an alternative to the other types of femoral nerve blocks, allowing sensory function to be blocked but motor function to that part of the pelvic limb to be spared.

## KEY LEARNING OBJECTIVES

- Describe the anatomy that is considered relevant when performing peripheral nerve blocks of the pelvic limb
- Name three different regional anaesthetic techniques that can be used to provide anaesthesia and analgesia to parts of the pelvic limb
- List the equipment and provide the name of a drug and the dose/volume that is required to perform each of these techniques

## MULTIPLE CHOICE QUESTIONS

1. Following injection of a local anaesthetic into the iliopsoas muscle under ultrasound guidance, which of the following nerve(s) will be desensitized?
  - (A) The sciatic nerve
  - (B) The femoral and/or obturator nerves
  - (C) The femoral and/or sciatic nerves
  - (D) The sciatic and/or obturator nerves
2. You are preparing to perform a femoral nerve block using an inguinal approach and electrolocation. Which of the following is correct?
  - (A) The femoral nerve is located cranial to the arterial pulse
  - (B) The femoral nerve is located caudal to the arterial pulse
  - (C) The femoral nerve is located superficial to the arterial pulse
  - (D) The femoral nerve is located deep to the arterial pulse
3. When approaching the sciatic nerve from a caudal direction using an ultrasound-guided technique with electrolocation, which of the following are you most likely to do?
  - (A) Stimulate the tibial branch of the sciatic nerve first, eliciting dorsiflexion of the tarsus and paw
  - (B) Stimulate the peroneal branch of the sciatic nerve first, eliciting dorsiflexion of the tarsus and paw
  - (C) Stimulate the tibial branch of the sciatic nerve first, eliciting plantar extension of the tarsus and paw
  - (D) Stimulate the peroneal branch of the sciatic nerve first, eliciting plantar extension of the tarsus and paw

# Abdominal and thoracic local anaesthesia techniques

**Matt Read**

This session will introduce the learner to the clinically relevant aspects of performing local and regional anaesthesia of the thoracic and abdominal walls of small animals. Relevant anatomy will be reviewed and some of the newer approaches to performing regional anaesthesia of the trunk and abdomen limb (e.g. intercostal nerve block, thoracic paravertebral block, transversus abdominis plane (TAP) block) will be discussed.

Many potentially invasive and painful surgical procedures are performed on the thorax and abdomen, making it important to be able to provide local and regional anaesthesia safely and effectively to these parts of the body. Sensory function to the trunk relies on innervation by spinal nerves. Since there is overlap between adjacent spinal nerves in terms of the areas they innervate, it is important to use a technique that does not result in blockade of a single nerve, otherwise the block may fail to achieve its intended purpose.

For many years, regional anaesthesia of the lateral thorax has been accomplished with intercostal nerve blocks. Using this technique, several consecutive nerves are blocked with local anaesthetic at a mid-thoracic level (from dorsal to ventral), caudal to each rib. The technique can be performed blindly, with nerve stimulation, or with ultrasound guidance. Unfortunately, performing intercostal nerve blocks in this way may not be entirely

effective for many patients, since this approach only blocks the ventral branches of the segmental spinal nerves, making it ineffective for providing anaesthesia for dorsal parts of the chest wall. For this reason, the recent development of an ultrasound-guided technique for depositing a local anaesthetic into the thoracic paravertebral space has been met with great interest. Different approaches to this block have previously been described in people and it has been used for providing excellent anaesthesia for thoracic procedures for many years. Using this ultrasound-guided technique in dogs, several spinal nerves can be blocked at a location close to their point of exit from the vertebral canal, allowing the local anaesthetic to block both the dorsal and ventral branches of the nerves and making the block more versatile for a range of procedures.

One of the most common parts of the body to undergo surgery is the abdomen. The simplest form of locoregional anaesthesia to this area involves the administration of a local anaesthetic solution into the tissues of the ventral abdominal wall along the planned surgical site, commonly referred to as a 'line' or an 'incisional' block. Depending on the drug and the volume of local anaesthetic that is used, this approach has been shown to result in variable levels of success. Recently, a block that works well in people has been developed for use in small animals. The TAP block is a muscle plane block and, when performed bilaterally, can provide anaesthesia to the abdomen for a variety of procedures. Using this technique, ultrasound is used to visualize the muscles of the abdominal wall and a needle is introduced into the interfascial space between the internal abdominal oblique muscle and the transversus abdominis muscle. When done correctly, as the local anaesthetic solution is injected, the space will distend with the drug solution and the nerves that run through the space will be blocked.

# Loco-regional anaesthesia

## KEY LEARNING OBJECTIVES

- Describe the anatomy that is considered relevant when performing peripheral nerve blocks of the chest and abdomen
- Name three different regional anaesthetic techniques that can be used to provide anaesthesia and analgesia to the chest and abdomen
- List the equipment and provide the name of a drug and the dose/volume that is required to perform each of these techniques

## MULTIPLE CHOICE QUESTIONS

1. Which of the following techniques would be most likely to provide dense and long-lasting unilateral anaesthesia for surgery involving the dorsal chest wall and thorax?
  - (A) Lumbosacral epidural anaesthesia performed using a local anaesthetic
  - (B) TAP blocks performed using a local anaesthetic
  - (C) Multilevel intercostal nerve blocks using a local anaesthetic

- (D) Multilevel thoracic paravertebral blocks using a local anaesthetic
2. When performing a TAP block, where is the local anaesthetic injected?
    - (A) Between the external oblique and internal oblique muscles
    - (B) Between the internal oblique and transversus abdominis muscles
    - (C) Between the transversus abdominis muscle and peritoneum
    - (D) Between the rectus abdominis and external oblique muscles
  3. Which of the following is correct when performing intercostal nerve blocks?
    - (A) The needle should be carefully walked off the caudal aspect of each rib
    - (B) The needle should be carefully walked off the cranial aspect of each rib
    - (C) An opioid such as morphine should be injected into the area around the target nerve(s)
    - (D) Inadvertent injection of the drug into the pleural space will have no effect on block success

## LA and analgesia cases: interactive session

### Matt Read and Jaime Viscasillas

This session will use case examples to illustrate how novel local anaesthetic techniques can be used to contribute to multimodal pain management in small animal patients. The use of indwelling perineural catheters will be discussed, as well as the use of a new formulation of local anaesthetic that has recently been made available for augmenting postoperative pain control. Delegates will be challenged to think about how they might be able to incorporate non-traditional methods of local anaesthesia into their own practice.

Several different approaches have been used in people and animals in attempts to prolong the beneficial analgesic effects of locoregional anaesthetic techniques for perioperative pain control. Until now, this has typically been achieved by either adding another agent to the local anaesthetic solution prior to its administration, or using special equipment, such as indwelling catheters to continuously or intermittently deliver a local anaesthetic solution into the affected area.

The use of epidural and peripheral nerve catheters is gaining popularity in veterinary medicine. Epidural catheters can be used to provide analgesia for surgical and non-surgical cases and the advantages and disadvantages of their use have previously been documented.

More recently, the use of peripheral nerve catheters (e.g. brachial plexus, lumbar plexus or sciatic nerve) has been reported. Advantages to their use include providing analgesia that is limited to the area that is innervated by that nerve/plexus and the ability to individualize the local anaesthetic solution that is administered through the catheter (i.e. volume, concentration, dosing interval) for the patient. Ultimately, these characteristics allow us to obtain good analgesia with minimal motor blockade. However, these techniques are still not commonly used, and training and continuous monitoring of the patient are needed in order to achieve positive outcomes.

Based on the limitations of using the above techniques, a new, novel local anaesthetic formulation has recently become available in the USA for use in people and animals and its use will probably spread to other parts of the world in the near future. Liposome-encapsulated bupivacaine is a specially formulated local anaesthetic that slowly releases active bupivacaine from the site of injection over several days. This drug was originally approved for administration as a field block into the surgical site at the time of surgery. Since the new formulation of the drug does not spread from the site of injection, it needs to be administered as multiple, small injections into all of the tissues of the surgical layers at the time of incisional closure, as opposed to a larger volume at only one or two sites. This new formulation has been shown to provide pain relief for up to 72 hours following a single dose in dogs and cats (and people) and is an excellent alternative to opioid-based analgesia for a variety of surgical procedures. Although it was initially approved only for infiltration use following cruciate repair

surgery in dogs, it has recently been approved for perineural use as well, opening up exciting new possibilities for providing multimodal pain management to our patients.

Finally, local anaesthetic techniques are commonly used in human medicine to treat chronic pain or to provide palliative care analgesia. As such, some of the perioperative techniques that we already apply in animals can be used as an alternative to systemically administered drugs in some of our patients, simply by changing the drugs that we administer with the block. Epidural injection of steroids is already an accepted technique to treat lumbosacral pain in dogs. Use of ultrasound-guided nerve root injections may prove to be another technique for providing analgesia to veterinary patients with chronic pain that are not good candidates for surgical treatment.

### KEY LEARNING OBJECTIVES

- Name a new local anaesthetic formulation that can provide up to 72 hours of analgesic effect
- Describe the indications for, and limitations of, using peripheral nerve catheters to manage perioperative pain
- Identify clinical scenarios in which to use local anaesthetic techniques for chronic pain management

### MULTIPLE CHOICE QUESTIONS

1. Which is the most common complication related to the use of brachial plexus catheters in dogs?  
(A) Catheter dislodgement  
(B) Hypotension  
(C) Nerve damage  
(D) Infection
2. Which of the following statements about liposome-encapsulated bupivacaine is correct?  
(A) It cannot be combined with any other drug or electrolyte solution  
(B) It should be administered as a large volume at a single site  
(C) It is designed to slowly release lidocaine over 72 hours  
(D) It is approved for both perineural and infiltration use
3. How long do the analgesic effects of a nerve root injection with a steroid typically last?  
(A) Between 1 week and 1 month  
(B) Up to 6 months  
(C) It depends on the patient  
(D) No more than a year





## Section III

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# Veterinary streams

Sunday 7 April

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Sunday 7 April  
Hall 4

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# Cardiology

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- 162 09:00–09:45  
**Cardiac therapeutics: atrioventricular valve disease**  
Sonya Gordon
- 163 09:55–10:40  
**Cardiac therapeutics: feline cardiology**  
Kieran Borgeat
- 164 11:15–12:00  
**Cardiac therapeutics: dilated cardiomyopathy**  
Sonya Gordon
- 165 12:10–12:55  
**Cardiac therapeutics: medical treatment of arrhythmias  
(in dogs with dilated cardiomyopathy)**  
Sonya Gordon
- 166 14:15–15:00  
**Challenging cases: approach to the patient with cardiac disease  
and renal dysfunction**  
J.D. Foster
- 167 15:10–15:55  
**Challenging cases: approach to the cardiac patient with  
concurrent respiratory disease**  
Kieran Borgeat
- 168 16:05–16:55  
**Cardiac therapeutics: pericardial disease**  
Sonya Gordon

## Cardiac therapeutics: atrioventricular valve disease

Sonya Gordon

Chronic atrioventricular valve disease (CVD) is the most common cause of heart disease and heart failure in the dog, accounting for approximately 75% of all canine heart disease. Older small-breed dogs are predisposed, but older large breeds are also at risk. The aetiology of CVD is unknown. CVD pathophysiology is characterized by myxomatous degeneration of the mitral valve, and can also involve the tricuspid valve (30%) and associated chordae tendinae. Progressive degeneration leads to increasing severity of regurgitation and associated atrial and ventricular dilatation.

Progression of the preclinical stage of CVD is typically slow, lasting years, however some individual dogs may experience more rapid progression. A staging scheme for CVD was introduced in the 2009 ACVIM Consensus Statement and has been widely adopted in veterinary medicine.

### CLASSIFICATION SCHEME FOR CHRONIC ATRIOVENTRICULAR VALVE DISEASE

The ABCD classification scheme incorporates the presence and absence of signs of heart disease or heart failure with structural heart changes and provides a platform for discussion of both diagnosis and treatment of CVD.

- Stage A dogs are at increased risk for developing or currently having preclinical heart disease. Stage A dogs are normal (asymptomatic and with no identifiable structural disorder of the heart)
- Stage B dogs have heart disease but have never developed clinical signs caused by heart disease (i.e. asymptomatic). Because there are important clinical implications for prognosis and treatment, this stage is subdivided into B1 and B2:
  - Stage B1 refers to asymptomatic dogs that have no radiographic or echocardiographic evidence of chamber enlargement
  - Stage B2 refers to asymptomatic dogs that demonstrate evidence of chamber enlargement
- Stage C dogs have either historical or current clinical signs of heart failure secondary to atrioventricular valve disease
- Stage D represents the end-stage of heart failure when dogs suffer from clinical signs that are refractory to 'standard therapies'

### STAGE-BASED MANAGEMENT STRATEGIES

Stage A patients will benefit from annual auscultation to detect if and when they develop a murmur characteristic of atrioventricular valve disease. Once a characteristic murmur is detected the dog is considered stage B and imaging (e.g. echocardiography, thoracic radiographs) is recommended to determine if the heart is enlarged (stage B2) or not (stage B1). In stage B1, recommendations for therapy are not currently warranted and emphasis is on scheduled follow-up evaluation and client education. Stage B2 is characterized by heart enlargement and based on the results of the EPIC study, pimobendan is recommended if the degree of heart enlargement is sufficient in magnitude. Recommendations for stage C dogs are predominantly evidence based and multimodal, including a combination of furosemide, pimobendan, spironolactone and an angiotensin-converting enzyme inhibitor. Recommendations for stage D are often symptom-specific. All stages benefit from scheduled follow-up and client education.

### KEY LEARNING OBJECTIVES

- Know how to use the ABCD staging scheme for chronic atrioventricular valve disease (CVD) and understand how the classification scheme supports a logical approach to diagnostic, therapeutic and follow-up recommendations
- Review the new evidence-based recommendations for treatment of dogs with preclinical CVD
- Review recommendations for treatment of dogs with congestive heart failure secondary to CVD

### MULTIPLE CHOICE QUESTIONS

1. With respect to pimobendan treatment, which of the following is a current recommendation in dogs with CVD? Pimobendan treatment is indicated in dogs with CVD stage:
  - (A) Stage B2
  - (B) Stage B1
  - (C) Stage A
  - (D) None of the above
2. What therapy(s) is/are recommended in dogs with stage C CVD?
  - (A) Pimobendan
  - (B) Furosemide
  - (C) Benazepril
  - (D) All of the above
3. Which diagnostic test is recommended to assess heart size in dogs with stage B CVD?
  - (A) Echocardiogram
  - (B) Thoracic radiographs
  - (C) Systemic blood pressure
  - (D) Electrocardiogram

# Cardiac therapeutics: feline cardiology

Kieran Borgeat

## EVIDENCE BASE AND CONSENSUS IS LACKING

In an era of evidence-based medicine, feline cardiology still lacks a good foundation of published therapeutic trials to justify decision making in treatment. In the absence of evidence, the profession looks to expert consensus to pull together our approach. Sadly, consensus and evidence are out for lunch, so we are left with opinion and extrapolation. Herein, we will review my personal approach, and that of my department and some colleagues at other centres.

## TREATMENT BEFORE SIGNS OF CONGESTIVE HEART FAILURE

### Left ventricular outflow tract obstruction

In humans, left ventricular outflow tract obstruction (LVOTO) has been associated with clinical signs. This seems to be rare in cats, save those which present with syncope or open-mouth breathing after exercise or play. Atenolol, a beta-blocker, has been used to reduce the severity of LVOTO – however, one study (non-randomized, not blinded), suggested that there was no effect of atenolol treatment on 5-year outcome. In our clinic, we reserve atenolol, therefore, for the cats which appear to have clinical signs associated with exertion.

### Left atrial dilation with poor function

Cats with left atrial (LA) dilatation and poor LA function are at greater risk of arterial thromboembolism (ATE). The FATCAT trial (2015) identified that cats with ATE live longer if treated with clopidogrel vs. aspirin, so we prescribe clopidogrel (18.75 mg orally q24h) to cats that we consider to be at risk of ATE, owing to LA dysfunction or the presence of spontaneous echocontrast.

### Systolic dysfunction

Cats with systolic left ventricular (LV) dysfunction can be treated similarly to dogs with preclinical dilated cardiomyopathy (DCM); by using pimobendan (generally 1.25 mg/cat orally q12h). Pimobendan is not only not licensed for cats, but is stated to be 'contraindicated' in diseases where LVOTO may be present. It is rare for us to prescribe it in cats with LVOTO on echo – if you are not confident in assessing obstruction on echo, it may be worth being cautious if the cat has a grade II–III or louder murmur; presume that LVOTO is present and avoid pimobendan.

## TREATING THE CAT WITH HEART FAILURE

Atenolol is contraindicated, regardless of the presence or absence of LVOTO – it will make heart failure signs worse. Clopidogrel should be used as before, and pimobendan if systolic dysfunction is present (without significant obstruction).

Pleural effusion should be drained via thoracocentesis and followed by injectable diuretics. Pulmonary oedema should be treated with parenteral furosemide, followed by oral dosing. Emergency patients should be handled with care, treated by sedation and oxygen therapy, as well as injectable diuretics. At discharge, we aim for furosemide (1–2 mg/kg orally q12h), combined with clopidogrel at least. The use of angiotensin-converting enzyme inhibitors (such as benazepril) in cats is an added extra; no evidence of clinically meaningful benefit has been published, despite some trials having been undertaken. We prescribe this if the cat is tolerating medication well and additional cost is no object. If hypokalaemia becomes an issue, or additional diuretics are required, spironolactone (2 mg/kg orally q24h) may prove useful.

## KEY LEARNING OBJECTIVES

- Understand the rationale for drug selection in cats with heart failure
- Appreciate the ethical considerations of treating arterial thromboembolism in cats and how to select patients with the best survival probability to treat
- Identify cats with preclinical heart disease that may benefit from treatment with an anti-platelet drug

## MULTIPLE CHOICE QUESTIONS

1. Cats with left ventricular outflow tract obstruction and clinical signs of syncope or exertional tachypnoea may rationally be treated with which of the following?
  - (A) Diltiazem
  - (B) Atenolol
  - (C) Clopidogrel
  - (D) Benazepril
2. When may pimobendan be used in cats with systolic dysfunction?
  - (A) Left atrial function on echo is poor
  - (B) The left ventricular dilation is present
  - (C) Furosemide is already prescribed
  - (D) Outflow tract obstruction is absent
3. Spironolactone may be useful in a cat with which of the following?
  - (A) Preclinical hypertrophic cardiomyopathy
  - (B) Escalating furosemide dose or hypokalaemia
  - (C) Pleural effusion caused by pericardial disease
  - (D) A history of syncope associated with exertion

## Cardiac therapeutics: dilated cardiomyopathy

Sonya Gordon

### CLASSIFICATION SCHEME FOR DILATED CARDIOMYOPATHY

- Stage A dogs have an increased risk of developing or having dilated cardiomyopathy (DCM). Stage A dogs are normal (asymptomatic with no identifiable structural disorder of the heart)
- Stage B dogs have DCM but have never developed clinical signs attributable to DCM (i.e. asymptomatic/preclinical). Because there are important implications for prognosis and treatment, stage B is subdivided into B1 and B2:
  - Stage B1 dogs have arrhythmias and no evidence of chamber enlargement
  - Stage B2 dogs demonstrate evidence of chamber enlargement with or without concurrent arrhythmias
- Stage C dogs have either historical or current clinical signs of congestive heart failure (CHF) secondary to DCM with or without concurrent arrhythmias
- Stage D dogs suffer from clinical signs that are refractory to 'standard therapies'

### DIAGNOSIS

#### Stage A

Stage A dogs should undergo echocardiographic screening when findings suggestive of DCM are detected in adult large- and giant-breed dogs based on history (e.g. mild exercise intolerance or syncope, unintended weight loss, mild increase in respiratory rate or effort) or physical examination (e.g. weak pulse, pulse deficits, arrhythmia, systolic murmur, gallop heart sounds), or annually in adult high-risk breeds.

#### Preclinical (stage B)

Definitive diagnosis and when to initiate therapy requires an echocardiogram and often an electrocardiogram (ECG)/Holter to detect/assess arrhythmias. Baseline radiographs for future comparison may also be useful. Additional diagnostic tests may also be indicated in some cases. A chemistry and blood pressure assessment may also be warranted prior to therapy.

#### Clinical/congestive heart failure (stage C)

For definitive diagnosis of CHF, thoracic radiographs are required. For identification of the aetiology of CHF an echocardiogram is indicated and often an ECG/Holter. Other tests such as chemistry and blood pressure are also indicated.

### TREATMENT

#### Stage A

Treatment is not recommended.

#### Stage B1

Treatment is typically not recommended, rather emphasis is on scheduled follow-up evaluation and client education. However, if a significant arrhythmia is documented, therapy may be indicated.

#### Stage B2

Pimobendan +/- angiotensin-converting enzyme inhibitors (ACEI) and anti-arrhythmics as indicated.

#### Stage C

Abdomino- or pleurocentesis as needed, furosemide, pimobendan, ACEI, spironolactone and anti-arrhythmics as indicated.

### FOLLOW-UP

#### General comments

Owners should be made aware of the value of scheduled follow-up and what signs are associated with disease progression/decompensation and thus warrant an unscheduled/emergency follow-up appointment. In addition, owners should be instructed to record weekly (stage B1) and daily (stage B2, C, D) home resting/sleeping respiration rates.

#### Stage B1

Repeat echocardiogram +/- ECG/Holter in 6 months to assess disease progression or sooner if indicated.

#### Stage B2

Recheck approximately every 6 months or sooner if indicated. Rechecks typically include a thorough history and physical examination, thoracic radiographs, systemic blood pressure and routine blood work. An ECG/Holter is indicated if signs suggestive of a new or progressive arrhythmia develop. Otherwise an annual Holter is recommended.

#### Stage C

Follow-up is similar to that for stage B2 with the exception of the recheck frequency which is every 3–4 months or sooner if indicated.

### KEY LEARNING OBJECTIVES

- Know how to use the ABCD staging scheme for dilated cardiomyopathy (DCM)
- Review the recommendations for treatment of dogs with preclinical DCM
- Review recommendations for treatment of dogs with congestive heart failure (CHF) secondary to DCM

### MULTIPLE CHOICE QUESTIONS

1. With respect to pimobendan treatment, which of the following is a current recommendation in dogs with DCM? Pimobendan treatment is indicated in dogs with DCM stage:



- (A) Stage B2
  - (B) Stage B1
  - (C) Stage A
  - (D) None of the above
2. What therapy(s) is/are recommended in dogs with congestive heart failure secondary to DCM?
- (A) Pimobendan
  - (B) Furosemide

- (C) Benazepril
  - (D) All of the above
3. Which finding(s) are suggestive of DCM in an older large-breed dog and warrant recommendation of an echocardiogram?
- (A) Gallop heart sounds
  - (B) Arrhythmia (non-sinus)
  - (C) Weak pulses
  - (D) All of the above

## Cardiac therapeutics: medical treatment of arrhythmias (in dogs with dilated cardiomyopathy)

Sonya Gordon

### DIAGNOSIS OF VENTRICULAR ARRHYTHMIA

Diagnosis of complex ventricular arrhythmia (VA) maybe suspected based on a history of exercise intolerance or collapse or represent an incidental finding on physical examination of dogs with any stage of dilated cardiomyopathy (DCM). The definition of complex VA is typically reserved for VA characterized by one or more of the following: multiform, runs, triplets, pairs or a bigeminal pattern, frequent single ventricular premature complexes (VPCs) (>10% total beats on Holter) or extremely premature VPCs (instantaneous heart rate (HR) >180 bpm). Once complex VAs are suspected, evaluation of the cardiac rhythm is indicated. A resting electrocardiogram (ECG) may confirm complex VA but in some cases a Holter (24-hour ambulatory ECG) will be required to both confirm the diagnosis and evaluate response to therapy.

### TREATMENT OF VENTRICULAR ARRHYTHMIA

Regardless of DCM stage, treatment of complex VA is recommended. Sotalol is the preferred chronic oral treatment (1–2.5 mg/kg, q12h). Sotalol should be used with caution and at the lower end of dosage range in dogs with congestive heart failure (CHF) and should not be combined with other beta-blockers or diltiazem. In dogs with ventricular tachycardia detected while they are in the hospital, a continuous rate infusion (CRI) of lidocaine should be used for 4–24 hours while oral sotalol is started and given enough time to start working before the dog is weaned off the lidocaine.

### DIAGNOSIS OF ATRIAL FIBRILLATION

Diagnosis of atrial fibrillation (AF) maybe suspected based on a history of exercise intolerance or collapse or

represent an incidental finding on physical examination of dogs with any stage of DCM. However, new-onset AF often precipitates the first episode or recurrence of CHF. Therefore, the clinical presentation maybe related to signs typical of CHF. Because AF is typically a sustained rhythm and frequently suspected based on physical examination, definitive diagnosis can be made with a resting ECG and a Holter is not required to establish a diagnosis. However, in some dogs a Holter is required to assess response to therapy.

### TREATMENT OF ATRIAL FIBRILLATION

Treatment for AF is typically based on average HR (based on ECG). In dogs with an average HR <150–160 bpm, medical management is typically not indicated. In dogs with an average HR >160 bpm, medical managements to reduce HR are typically indicated. The main goal of treatment is to alleviate any associated clinical signs and reduce the average HR to 140–160 bpm (in the hospital). Oral diltiazem is the initial treatment of choice, even in emergency situations oral diltiazem is typically preferred (2–8 mg/kg, total daily dose, divided q8h (regular diltiazem) or q12h (extended release)). Initial therapy should start at the lower end of the dosage range with up-titration to the desired effect on HR. Up-titration is based on recheck examinations at intervals of 7–14 days. Dogs in the preclinical stage can tolerate higher initial and target dosages. Once adequate control of HR has been documented, diltiazem is continued at that dose.

### KEY LEARNING OBJECTIVES

- Know the clinical signs and how to diagnose and monitor dogs with dilated cardiomyopathy (DCM) complicated by atrial fibrillation (AF) and/or complex ventricular arrhythmias (VAs)
- Review recommendations for treatment of VA in dogs with preclinical and clinical DCM
- Review recommendations for monitoring treatment of AF in dogs with preclinical and clinical DCM

### MULTIPLE CHOICE QUESTIONS

1. In dogs with preclinical DCM or CHF secondary to DCM and significant ventricular arrhythmias, what oral therapy is recommended for treatment of the arrhythmia?
- (A) Sotalol
  - (B) Amiodarone
  - (C) Diltiazem
  - (D) Atenolol

2. In dogs with preclinical DCM or CHF secondary to DCM and atrial fibrillation with an average heart rate of 180–200 bpm what oral therapy is recommended for treatment of the arrhythmia?  
 (A) Sotalol (C) Diltiazem  
 (B) Amiodarone (D) Atenolol
3. You are presented with a dog that has a historical diagnosis of preclinical DCM and is currently receiving pimobendan. The owner reports that the dog maybe experiencing some

exercise intolerance and has fainted once while playing. The home sleeping breathing rate is 17/min. Your physical examination is unremarkable. The respiration rate is 25 bpm and the heart rate is 130 bpm and regular. Which diagnostic test should be recommended in this dog?

- (A) Echocardiogram  
 (B) Thoracic radiographs  
 (C) Resting ECG (D) Holter

## Challenging cases: approach to the patient with cardiac disease and renal dysfunction

**J.D. Foster**

Cardiac and renal disease both have a high prevalence in humans and animals. Specialists and general practitioners consult on patients who are affected by these diseases on a daily basis. For many years, it has been recognized that a subpopulation of people may have both cardiac and renal disease simultaneously, and often these patients may have worse outcomes. Additionally, the therapy of cardiac disease has resulted in renal impairment, as much as treating kidney disease can lead to cardiovascular complications.

Recognizing similar patient populations where both the heart and kidneys could have decreased function, or lead to worsening function of the other, a veterinary consensus group comprising of cardiologists and nephrologists met in 2013 to define these disorders in small animals. Their opinions were published in 2015 using a refined title of cardiovascular renal disorders (CvRD) to highlight the role of vascular disease and complications within these patients.

The following categories of veterinary cardiovascular renal disease have been proposed:

- CvRD<sub>H</sub> – this subtype includes patients who develop renal dysfunction due to primary cardiovascular disease
- CvRD<sub>K</sub> – this subtype identifies patients with primary kidney disease who develop subsequent cardiovascular injury or dysfunction
- CvRD<sub>O</sub> – this subtype is where a primary non-renal, non-cardiac disease is affecting both kidney and cardiac function

### TREATING CARDIOVASCULAR RENAL DISORDERS IN VETERINARY PATIENTS

The management of patients with concurrent cardiac and renal disease remains challenging. Adverse drug effects and altered drug pharmacology occur in these

patients, potentially creating more obstacles to providing an acceptable quality of life. Close monitoring of patients with frequent reassessment of cardiac and renal biomarkers is an integral part of successful management.

- CvRD – in all forms of CvRD, patients should be monitored for derangements in blood pressure, intravascular volume, electrolyte disturbances, anaemia and adequate nutritional intake. When abnormal, therapy should be employed to correct such complications
- CvRD<sub>H</sub> – use the lowest dosage of a diuretic that successfully resolves congestion. Use of venous or arterial vasodilators may allow for reduced diuretic dosage. Monitor serum creatinine and renal biomarkers for evidence of renal injury-therapy should be adjusted if possible to resolve such complications
- CvRD<sub>K</sub> – judicious use of parenteral fluids to maintain intravascular volume and organ perfusion, while avoiding aggressive sodium, chloride and water administration. Correcting acid-base and electrolyte disturbances may allow for improvement in cardiac arrhythmias or contractility. Blood pressure control (both acute and chronic) is important to help prevent cardiac and vascular complications

### FUTURE DIRECTIONS IN THE MANAGEMENT OF CARDIOVASCULAR RENAL DISORDERS

As biomarkers of both cardiac and renal injury and dysfunction become validated and widely available for clinical usage, some may provide earlier and more specific methods to identify patients with active cardiac or renal injury, thus providing the opportunity for intervention prior to the development of congestive heart failure or uraemia. Additionally, diagnostic screening in patients who may be at risk of developing CvRD (older animals with chronic valvular disease, patients with advanced chronic kidney disease (CKD) with hypertension and anaemia, etc.) may select for more appropriate and safer therapeutics that can help avoid decompensation of organ function.

### KEY LEARNING OBJECTIVES

- Review the pathophysiology of cardiovascular-renal axis disorders and clinical examples in veterinary patients

- Understand how therapy for cardiac disease may negatively affect kidney function and vice versa
- Develop rational approaches for the patient with cardiovascular renal disorder to provide the best opportunity for successful management

### MULTIPLE CHOICE QUESTIONS

1. Which of the following is not negatively affected by cardiovascular disease?
  - (A) Renal perfusion
  - (B) Blood pressure
  - (C) Serum electrolyte concentrations
  - (D) Appetite
2. Which of the following is not negatively affected by renal disease?
  - (A) Hydration status
  - (B) Blood pressure
  - (C) Anaemia
  - (D) Arterial oxygenation saturation
3. What may optimal management of patients with cardiovascular renal axis disorders require?
  - (A) Oral diuretic and subcutaneous fluid therapy
  - (B) Vasodilator and low-dose diuretic therapy
  - (C) Alpha- and beta-adrenergic receptor antagonists
  - (D) Angiotensin-converting enzyme inhibitors and non-steroidal anti-inflammatory drugs

## Challenging cases: approach to the cardiac patient with concurrent respiratory disease

Kieran Borgeat

Factor	Heart failure	Respiratory disease
Physical examination	Tachycardia or bradycardia (pathological)	Normal heart rate
	Regular rhythm or frequent arrhythmia with no pattern	Patterned irregularity of sinus arrhythmia
	Poor pulse quality or hyperkinetic pulses	Normal pulse quality
	Mucous membrane pallor, prolonged capillary refill time	Normal membranes and refill time
	Rapid and shallow respiratory effort	Greater respiratory effort; expiratory if lower airways, inspiratory if upper airway
	Increased lung noise or fine pulmonary crackles	Loud crackles or wheezes
	Normal to thin body condition	Normal or obese body condition
Thoracic radiographs	Cardiomegaly	Normal heart size
	Pulmonary venous distension	Pulmonary veins normal/under-sized
	Alveolar or interstitial pulmonary infiltrates, often caudodorsal distribution	Bronchial or interstitial infiltrates most common, generalized or localized to a single lobe/side
Echocardiography	Left atrial dilatation	Normal left atrial size; unless concurrent heart disease
	Systolic dysfunction	Normal systolic function
	Possible pulmonary hypertension if chronic, severe left heart disease	Right ventricular remodelling associated with pulmonary hypertension if severe disease
Blood work	Often normal haematological profile	Inflammatory leucogram if pneumonia, eosinophilia if parasitism or eosinophilic bronchopneumopathy
	Azotaemia if severe drop in cardiac output, increased alanine aminotransferase if right-sided failure	Often normal biochemical profile

Figure 1: Heart failure vs. respiratory disease

# Cardiology

See Figure 1. In this lecture, we will discuss specific, real-life cases and review how and why we approached the cases in the way that we did.

## KEY LEARNING OBJECTIVES

- Consider clinical signs that help to identify dogs with heart failure vs. primarily respiratory signs
- Review thoracic imaging findings which highlight congestive heart failure cases
- Formulate a logical plan for treating respiratory disease in dogs with clinically significant heart disease

## MULTIPLE CHOICE QUESTIONS

1. What respiratory pattern is most suggestive of congestive heart failure?

- (A) Rapid and shallow
- (B) Expiratory effort
- (C) Inspiratory effort
- (D) Paradoxical pattern

2. What is coughing in heart disease most likely to be caused by?

- (A) Pulmonary oedema
- (B) Left atrial dilation
- (C) Bronchial oedema
- (D) Vascular distension

3. What is circulating eosinophilia in a coughing dog most likely to represent?

- (A) Aspiration pneumonia
- (B) Reduced cardiac output
- (C) A stress leucogram
- (D) Pulmonary parasitism

## Cardiac therapeutics: pericardial disease

Sonya Gordon

### CAUSES OF CANINE PERICARDIAL DISEASE (MOST COMMON\*)

- Congenital pericardial disease (PD): pericardial peritoneal diaphragmatic hernia (PPDH), pericardial defects, pericardial cysts
- Acquired PD\*: pericardial effusion, constrictive pericarditis, constrictive-effusive pericarditis

### CAUSES OF CANINE PERICARDIAL EFFUSION (MOST COMMON\*)

- Neoplasia\* (haemangiosarcoma\*, chemodectoma\*, mesothelioma, lymphoma, thyroid carcinoma, parathyroid masses)
- Idiopathic\*
- Infectious: bacterial, fungal (coccidiomycosis, aspergillosis), viral
- Traumatic: atrial rupture in chronic degenerative valve disease, hit by a car, cardiac perforation (iatrogenic during catheterization)
- Coagulopathy, e.g. rodenticide toxicity
- Uraemia
- Congestive heart failure (CHF): typically scant/mild with no tamponade and therefore treatment is related to management of CHF without pericardiocentesis
- Migrating foreign body, e.g. porcupine quill

### MANAGEMENT OF CANINE PERICARDIAL EFFUSION

Pericardial effusion (PE) can lead to life-threatening cardiac tamponade. Cardiac tamponade results when the

volume of PE causes an increase in pressure in the pericardial space, which impairs preload reducing cardiac output. Tamponade is a function of volume of PE and the time it took for the PE to develop. Tamponade can occur in varying degrees of severity, with resultant clinical signs of exercise intolerance or complete circulatory shock.

Moderate to severe tamponade should be treated with intravenous fluids which can help stabilize cardiac output while pericardiocentesis is attempted. Diuretics should not be administered because they will further reduce cardiac output. Emergency pericardiocentesis relieves tamponade and normalizes cardiac output. It is therefore essential for veterinary surgeons to recognize clinical signs of moderate to severe cardiac tamponade. Long-term prognosis and management recommendations depend on the underlying cause of the PE. Because moderate to severe tamponade is life-threatening, referral is frequently not an option and stabilization is necessary prior to referral. Referral can be considered in dogs with no to mild tamponade. An echocardiogram (if available) should be performed prior to tapping if at all possible as the sensitivity for tumour identification is higher when effusion is present. Referral once stable can help make owners aware of all options with respect to chronic management.

### SIGNS CONSISTENT WITH CARDIAC TAMPONADE IN DOGS

#### Clinical signs

- Exercise intolerance, weakness, or collapse
- Abdominal distention caused by ascites and/or hepatomegaly
- Jugular distention or positive hepatojugular reflux test
- Sinus tachycardia with or without arrhythmias
- Weak femoral arterial pulses with or without deficits and pulsus paradoxus (reduction or absence of pulse during inspiration)
- Muffled heart sounds

## Echocardiographic signs

- Pericardial effusion
- Right atrial and/or ventricular collapse
- Small left ventricular chamber size in systole and diastole

## Electrocardiographic signs

- Small QRS complexes
- Electrical alternans
- Sinus tachycardia
- Arrhythmias: ventricular premature complexes or ventricular tachycardia
- ST-segment elevation or depression

## CAUSES OF FELINE PERICARDIAL DISEASE (MOST COMMON\*)

- Congenital disorders: PPDH\* (rarely the result of trauma), pericardial cysts
- Acquired disorders\*: PE

## CAUSES OF FELINE PERICARDIAL EFFUSION (MOST COMMON\*)

- CHF\*
- Infectious: feline infectious peritonitis (FIP), fungal infection (e.g. coccidiomycosis)
- Neoplasia: lymphoma

## MANAGEMENT OF FELINE PERICARDIAL EFFUSION

Tamponade is rare and thus pericardiocentesis is rarely indicated. Since the most common cause of PE in the cat is CHF, the long-term prognosis is typically related to that

of the underlying cardiomyopathy that led to CHF. Pericardiocentesis in the cat (if necessary) typically requires general anaesthesia and is associated with a significant risk of life-threatening complications.

## KEY LEARNING OBJECTIVES

- Know the common causes of pericardial disease (PD) in the dog and cat
- Know the signs of tamponade and when and how to perform pericardiocentesis
- Know when referral to a specialist is recommended in patients with PD

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is/are a clinical sign(s) consistent with cardiac tamponade?
  - (A) Pulsus paradoxus
  - (B) Jugular distention
  - (C) Tachycardia
  - (D) All of the above
2. Which of the following is the recommended therapy in dogs with cardiac tamponade?
  - (A) Furosemide
  - (B) Atropine
  - (C) Intravenous fluids
  - (D) Pimobendan
3. Which of the following is the most common cause of pericardial effusion in the cat?
  - (A) Haemangiosarcoma
  - (B) Idiopathic
  - (C) Congestive heart failure
  - (D) Atrial rupture



Sunday 7 April  
Hall 6

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# Immunology

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- 172 08:45–09:30  
**Understanding immunological testing**  
James Swann
- 172 10:05–10:55  
**Immune-mediated skin disease**  
Laura Buckley
- 173 11:00–11:45  
**Novel immunotherapy**  
James Swann
- 174 13:05–13:50  
**Glomerulonephritis**  
J.D. Foster
- 175 14:00–14:20  
**How to collect CSF samples**  
Paul Higgs
- 176 14:25–14:45  
**How to perform joint taps**  
Paul Higgs
- 177 14:55–16:35  
**Stiff, painful and pyrexia: an interview with a medic, a neurologist and orthoped**  
Duncan Barnes, Vicki Black and Jeremy Rose

## Understanding immunological testing

James Swann

Various clinical tests are available in cats and dogs to investigate whether the immune system is functioning normally; these typically are used for diagnosis of immune-mediated diseases or immunodeficiencies. In most cases, results of these tests must be interpreted in the context of other clinical information, particularly the presenting complaints and results of other clinicopathological tests, such as complete blood counts and biochemical profiles.

Most autoimmune diseases are associated with production of autoreactive antibodies specific for normal antigens, even if these do not contribute to the development of the clinical signs. Detection and measurement of the concentration of these antibodies in serum therefore represents an important diagnostic test for several immune-mediated diseases in dogs and cats, including immune-mediated haemolytic anaemia (IMHA), masticatory muscle myositis and myasthenia gravis. These antibodies may be detected using different methodologies with varying limitations. For example, anti-red blood cell antibodies may be detected in dogs with IMHA using either the direct antiglobulin (Coombs') test or flow cytometry: direct antiglobulin tests are probably more specific but less sensitive than flow cytometry, because the former test will only produce a positive result if many antibodies are bound to each red blood cell. Most tests for autoantibodies are reported as semiquantitative titres, which reflect the maximum dilution of serum at which a positive result can still be observed. However, methods for performing these tests also vary among diagnostic laboratories, introducing further complications in their clinical interpretation.

Immunodeficiencies usually are suspected in young animals presenting with persistent or recurrent infections. Such animals theoretically may have defects in any component of the immune system, particularly granulocytes, T cells, B cells and antibodies. Complete blood counts will reveal deficiencies in the major groups of leucocytes, but flow cytometry may be used to investigate whether different groups of lymphocytes, such as CD4<sup>+</sup> and CD8<sup>+</sup> T cells are present in the correct proportions. In people,

flow cytometry may also be used to determine whether leucocytes express important proteins on their surface, which are required for their functions in the immune response. Concentrations of the different classes of immunoglobulin, including IgG, IgM and IgA, may also be measured to determine if there is a selective deficiency in one type of antibody. These tests may be complemented by genetic tests available for diseases in particular breeds, such as leucocyte adhesion deficiency in Irish Setters.

### KEY LEARNING OBJECTIVES

- Describe the major tests available for detection of autoreactive antibodies for diagnosis of immune-mediated diseases in dogs and cats
- Understand the limitations associated with tests for autoreactive antibodies in dogs and cats, depending on the method used for their detection
- Formulate a sensible approach to immunological testing in dogs with clinical signs consistent with primary immunodeficiency

### MULTIPLE CHOICE QUESTIONS

1. Which is the most common class of anti-red blood cell antibody observed in dogs with IMHA?  
(A) IgG  
(B) IgM  
(C) IgA  
(D) IgD
2. Detection of which autoantibodies may be used to support a diagnosis of masticatory muscle myositis?  
(A) Anti-neutrophil cytoplasmic antibodies  
(B) Anti-2M antibodies  
(C) Acetylcholine receptor antibodies  
(D) Anti-ganglioside antibodies
3. Which class of antibody is deficient in Cavalier King Charles Spaniels infected with *Pneumocystis jirovecii*?  
(A) IgM  
(B) IgA  
(C) IgG  
(D) IgD

## Immune-mediated skin disease

Laura Buckley

Immune-mediated skin diseases (IMSDs) are well recognised but uncommon diseases. Primary IMSD is made up of immunodeficiency, hypersensitivity (allergy) and autoimmune disease. The latter is the focus of this lecture and occurs when the immune system fails to tolerate self-antigens and mounts an immune response (via production

of antibodies or activated lymphocytes) against normal skin components. Secondary IMSD develops in response to a foreign antigen, most commonly drugs, bacteria or viruses.

### HISTORY AND CLINICAL SIGNS

The investigation of IMSD requires careful consideration of key historical features and the identification of a typical character and distribution of skin lesions. Diagnostic investigations are important in achieving a diagnosis but in some cases can be non-specific and, unless they are considered in the light of an accurate history and appropriate clinical signs, they may be misleading. Most IMSDs



have a classic clinical presentation and/or breed predilections and these are discussed in detail in the lecture.

## APPROACH TO DIAGNOSIS

Key historical features and the character and distribution of skin lesions are used to formulate a rational, prioritized differential diagnosis list, which is then used to make a diagnostic plan. The vast majority of IMSD are investigated by performing skin biopsy for histopathology with or without direct impression smear cytology. The following guide to biopsy will aid in obtaining diagnostic samples:

- Take multiple biopsy specimens
- Sample lesions most representative of suspected disease based on differential diagnoses
- Sample new lesions if possible
- Avoid heavily eroded or ulcerated lesions as these provide no information on epidermal pathology; sample from the margin of these lesions
- Take care when performing punch biopsies (minimum 6 mm); do not aseptically prepare site, ensure epidermis remains intact, take full skin thickness biopsy specimen, do not crush sample
- Performing wedge/elliptical biopsies with a scalpel may be necessary to remove large, intact lesions (vesicle, bulla) or to sample the margin of a lesion or sample difficult body site (pinna, nasal planum, foot)
- Submit samples in separate formalin pots indicating sample site and character of lesion
- Submit samples to a laboratory that has a dermatohistopathologist and include history, clinical signs and differential diagnoses

In some cases, treatment may need to be started before all diagnostic tests are received, however, confirming the diagnosis will allow for prognostication, a more targeted treatment approach and will make review of therapy easier in poorly responsive cases.

## TREATMENT

This involves removal or treatment of any external triggers such as drugs, ultraviolet light or confirmed infections and control of the inappropriate immune response. The latter is usually achieved with immunosuppressive/immunomodulatory drugs. Mild or localized disease may be treated less aggressively or by using topical therapies. For severe or relapsing disease, combination drug therapy is generally more effective and often better tolerated. Baseline drug monitoring (usually complete blood count, biochemistry and urinalysis) are obtained prior to starting immunosuppressive therapy. There are three phases of treatment:

1. Induction of remission: days to weeks, aggressive therapy, may need to change/add treatments if minimal response after 2–4 weeks, try to avoid severe adverse effects, regular treatment monitoring
2. Transition: weeks to months, taper to lowest effective dose, taper drugs with most risk of adverse effects first, treatment monitoring frequency reduces with time and absence of adverse effects, if no relapse with advanced dose tapering stop treatment to determine cures
3. Maintenance: months to years, maintain lowest effective dose and monitor for adverse effects in cases where relapses have occurred in transition phase, treatment monitoring as determined by treatment and dose, further tapering should be considered if disease in remission for many months

## KEY LEARNING OBJECTIVES

- Evaluate patient history and clinical signs to create differential diagnosis lists
- Understand the use of differential diagnosis lists to lead the investigation of immune-mediated skin diseases
- Accurately interpret diagnostic tests in the light of clinical findings to make a definitive diagnosis and initial treatment plan

## MULTIPLE CHOICE QUESTIONS

1. Autoimmune disease occurs as a result of an abnormal immune response directed towards which of the following?
  - (A) Drug antigens
  - (B) Self-antigens
  - (C) Bacterial antigens
  - (D) Viral antigens
2. Which of the following would be an appropriate lesion to sample by performing a punch biopsy?
  - (A) Pustule on ventral abdomen
  - (B) Bulla on oral mucosa
  - (C) Ulcer on the interdigital skin
  - (D) Vesicle on nasal planum
3. Blood monitoring should be performed every 7–14 days during which phase of management of IMSD?
  - (A) Induction of remission
  - (B) Transition
  - (C) Maintenance
  - (D) Cure

# Novel immunotherapy

**James Swann**

Traditionally, immune-mediated and hypersensitivity diseases have been treated using broad-spectrum immuno-

suppressive drugs that inhibit many parts of the normal immune response. Whereas these drugs often are effective, they may cause adverse effects related to their lack of specificity. In particular, administration of glucocorticoids at high doses suppresses the immune responses but causes numerous metabolic and musculoskeletal changes that may compromise quality of life. There is therefore a major clinical need to develop new forms of

treatment that modulate aberrant activity of the immune system without causing off-target effects.

Development of monoclonal antibody therapies has been revolutionary in the management of many autoimmune and inflammatory diseases in humans because these molecules target a single molecule or cell type associated with disease. Examples include use of antibodies specific for tumour necrosis factor alpha (TNF $\alpha$ ) for rheumatoid arthritis and anti-CD20 antibodies for management of B cell lymphoma. Similar 'biological' therapies are currently being developed for use in dogs, including 'caninized' anti-CD20 antibodies for treatment of B cell lymphoma and anti-interleukin-31 antibodies (lokivetmab) for atopic dermatitis. It is likely that anti-TNF $\alpha$  antibodies will also be produced and marketed for dogs, with potential applications in the management of inflammatory bowel disease and inflammatory arthritis.

Allergen-specific immunotherapy already is used widely in dogs with atopic dermatitis to try to restore tolerance to innocuous antigens, whereas injection of DNA encoding a tumour-related antigen may also be used to stimulate helpful immune responses in dogs receiving 'melanoma vaccines'. As demonstrated by these examples, responses to injection of antigens may vary widely depending on the form and concentration of the antigen, the route of delivery and the presence of any adjuvant, highlighting the need for extensive testing before these forms of therapy are introduced more widely for treatment of immune-mediated diseases.

Various cell-based therapies are currently being trialled in people, all involving infusion of leucocytes from the same patient or from a donor to try to control or cause an immune response. Therefore, in some people due to undergo transplantation, immunosuppressive regulatory T cells (Tregs) are harvested and expanded *ex vivo* before being infused back into the patient immediately after their operation to try to reduce the risk of rejection. In the context of cancer, a similar approach may be used to identify or modify T cells specific for cancer antigens and expand them *ex vivo*; when re-infused, these cells should target the tumour specifically.

This form of treatment is currently being trialled in some centres in the USA and may become available in the clinic in future.

## KEY LEARNING OBJECTIVES

- Understand the mechanism of action of forms of immunotherapy in current clinical use, including allergen-specific immunotherapy, cancer vaccines and anti-interleukin-31 antibodies
- Describe the limitations and possible side effects associated with immunotherapies in current clinical use
- Identify possible novel targets for more specific therapies targeting the immune system

## MULTIPLE CHOICE QUESTIONS

1. Antibodies specific for which cytokine are currently used for management of atopic dermatitis in dogs?  
(A) Interleukin 21  
(B) Interleukin 31  
(C) Interleukin 41  
(D) Interleukin 51
2. Which antigen is contained in melanoma vaccines currently administered to tumour-bearing dogs?  
(A) Tyrosinase  
(B) Melanin  
(C) Chitin  
(D) Hyaluronic acid
3. Administration of anti-CD20 antibodies will preferentially deplete which type of immune cell?  
(A) T cells  
(B) B cells  
(C) Neutrophils  
(D) Eosinophils

# Glomerulonephritis

**J.D. Foster**

Healthy dogs and cats will excrete small amounts of protein within their urine. The term proteinuria is used to indicate the presence of abnormal/excessive amounts of protein within urine. Proteinuria has numerous causes and can be differentiated due to its origin. This categorization scheme can help guide diagnostic and therapeutic decisions.

Prerenal proteinuria is the appropriate filtration of abnormally occurring proteins present in plasma. The condition may develop secondary to haemoglobinaemia and myoglobinaemia, respectively caused by red blood cell (RBC) haemolysis and muscle damage. Bence-Jones proteins are immunoglobulin light chains, which may be elevated in neoplastic disorders such as multiple myeloma

and can accumulate within urine. Similar to prerenal causes of proteinuria, in postrenal proteinuria the nephron and glomerular filtration barrier are normal. In this category, protein enters the urine after the nephron (renal pelvis and beyond). Most commonly, these proteins arise from the urinary tract itself. Inflammation, infection and neoplasia of the urinary tract can result in proteins exuding from the urothelium into urine.

While altered permeability within the glomeruli and the renal interstitium may both cause renal proteinuria, glomerular disease can produce the highest magnitude. Such a condition, glomerulonephropathy, is often referred to as glomerulonephritis (GN) although not all aetiologies truly involve inflammation. Major causes of GN include immune-complex deposition, amyloidosis, glomerulosclerosis (scarring of the glomerulus), congenital genetic disorders, and secondary infectious or inflammatory conditions. Renal biopsy with detailed histopathological examination is the only method to differentiate these disorders.

## IMMUNE-COMPLEX GLOMERULONEPHRITIS

In the largest study of renal histopathology in the dog, immune-complex glomerulonephritis (ICGN) was found in 48% of all samples submitted. Immune complexes may represent antigen–antibody (Ag–Ab) complexes passively trapped in the glomerular basement membrane (GBM) from circulation or could occur due to *in situ* formation. Once antigens or Ag–Ab complexes are deposited in the glomerulus, several different immune responses may occur. Changes in glomerular permselectivity result from glomerular capillary wall injury due to activation of inflammatory cascades secondary to the immune deposits. Antibodies against GBM antigens can directly increase glomerular permeability, as well as induce inflammation or complement cascade activation, further increasing permeability.

## NON-IMMUNE-COMPLEX GLOMERULONEPHRITIS

Non-ICGN is a broad category of glomerular lesions in which neither immune complexes nor amyloid can be identified and is therefore a diagnosis of exclusion. The non-ICGN group includes focal segmental to global glomerulosclerosis, abnormalities of the GBMs without associated sclerosis, glomerular lipidosis, and congenital or developmental nephropathies that involve glomeruli. Glomerulosclerosis, specifically focal segmental glomerulosclerosis, as a cause of proteinuria was once under-recognized in veterinary medicine, even though it is considered to be a common cause of proteinuria in humans. Evidence points to podocyte injury as an inciting factor in the development of glomerulosclerosis, and mutated podocyte genes, toxic insults, viral infections and cytoskeletal stress from cell hypertrophy have all been demonstrated to injure this cell lineage. Genetic mutations in GBM proteins or collagen have been identified to cause protein-losing nephropathy in numerous breeds.

## MANAGEMENT

The recognition of ICGN is an important step in the management of proteinuria, as these patients typically require immunosuppressive therapy in addition to the standard medications. With the addition of immunosuppression,

some patients have demonstrated complete and long-term remission of their disease.

## KEY LEARNING OBJECTIVES

- Review the common causes of proteinuria and how to identify patients with suspected glomerular disease
- Know the indications for renal biopsy, how to perform it, and how to have the samples analysed
- Learn how to tailor therapy for patients with glomerular disease, decreased kidney function and immune-complex disease

## MULTIPLE CHOICE QUESTIONS

1. Which of the following scenarios is most likely to be representative of renal proteinuria?
  - (A) A dog with intravascular haemolytic anaemia and haemoglobinuria
  - (B) A dog with hypoalbuminaemia, normoglobulinaemia, hypercholesterolaemia and increased urine protein:creatinine ratio
  - (C) A dog with a positive microalbuminuria test identified as part of yearly wellness examination
  - (D) A dog with 4+ proteinuria on a urine dipstick with an active urinary sediment
2. Which of the following can be used to differentiate glomerular disease from other causes of proteinuria?
  - (A) Magnitude of proteinuria
  - (B) Breed of dog
  - (C) Renal biopsy result
  - (D) Renal ultrasonography results
3. A dog with immune-complex glomerulonephritis would benefit from long-term administration of all the below therapies EXCEPT which one?
  - (A) Doxycycline
  - (B) Benazepril
  - (C) Amlodipine
  - (D) Mycophenolate

## How to collect CSF samples

### Paul Higgs

Once mastered this procedure is relatively simple, however, it should never be taken lightly. There are some risks to the patient when performing the procedure and certain precautions should be taken. As long as a sensible routine is followed the risk is actually low.

Indications for cerebrospinal fluid (CSF) sampling include:

- Seizure investigations
- Abnormal central nervous system (CNS) function
- Pyrexia of unknown origin
- Optic neuritis

Contraindications for CSF sampling include:

- Coagulopathy
- Raised intracranial pressure (ICP)
- Chiari malformation or other significant abnormalities in skull anatomy
- Suspected bacterial meningitis
- Local skin infection at the site of sampling

In the presence of raised ICP, the rapid removal of CSF may precipitate a caudal shift of brain parenchyma. This may cause cerebral herniation with resultant crowding of

the brainstem often accompanied by fatal compression of the medullary respiratory centre causing respiratory arrest. Ultimately, if findings consistent with raised ICP are present, the diagnostic advantages of CSF collection and analysis must be carefully weighed up against the risk of collection-induced herniation and owners counselled accordingly.

## PATIENT PREPARATION

A full anaesthetic is essential in these cases. Any movement during sampling would risk damage to the spinal cord or major blood vessels in this region. It is also essential to consider the individual patient that is having this procedure; dogs with domed heads or those with known predisposition to Chiari malformation should either have a magnetic resonance imaging (MRI) scan prior to CSF sampling or the sample should be taken from the lumbar region.

## CEREBROSPINAL FLUID SAMPLING

The technique will be discussed in the lecture with visual aids. Additional notes:

- If the needle is slightly misdirected laterally it is common to get blood in the hub of the needle. This is very unlikely to cause significant bleeding, however, the needle should be immediately removed and the procedure started again. Contamination of CSF with blood may affect some results after this
- If the needle is misdirected caudally or cranially you will hit bone. It is possible to 'walk' the needle off of these bony processes and into the CSF space, however, the flexibility of the needles can make this difficult
- In cats and small dogs, the CSF space is a remarkably short distance from the skin surface. It is essential that the stylet is removed and the needle advanced with care as soon as the skin has been penetrated
- Once CSF is seen in the hub it is essential that the needle is not advanced any further, even if CSF stops flowing. This may result in penetration of the CNS tissue and damage to the spinal cord or caudal brain stem may result

## SAMPLE HANDLING

The CSF is hypotonic and it would be expected that any nucleated cells in the CSF will have lysed within 24 hours and certainly by 48 hours. It is sensible to arrange for immediate transport of the sample to the laboratory for assessment. If this is not possible, however, contact your laboratory for advice.

## KEY LEARNING OBJECTIVES

- Understand the correct positioning for obtaining cerebrospinal fluid (CSF) samples
- Identify the indications and contraindications for CSF sampling
- Understand the technique for obtaining and handling a CSF sample

## MULTIPLE CHOICE QUESTIONS

1. Which of the following statements is CORRECT regarding positioning of patients for cisternal CSF sampling?
  - (A) The patient should be positioned in sternal recumbency with a straight neck
  - (B) The patient should be positioned in lateral recumbency with a straight neck
  - (C) The patient should be positioned in lateral recumbency with a 90° flexion to the neck
  - (D) The patient should be positioned in sternal recumbency with a 90° flexion to the neck
2. Which of the following is a contraindication for CSF sampling?
  - (A) Status epilepticus
  - (B) Hind limb ataxia
  - (C) Pyoderma at the site of sampling
  - (D) Optic neuritis
3. Which of the following statements is CORRECT regarding cerebrospinal fluid?
  - (A) The protein content in CSF is greater than that of plasma
  - (B) Approximately 1 drop of serum can be added to CSF to help preserve cells for analysis
  - (C) Eosinophils are a normal finding in CSF
  - (D) A minimum of 3 ml of CSF is required for analysis

# How to perform joint taps

## Paul Higgs

Taking joint samples is sometimes an essential component to investigations into lameness, pyrexia of unknown origin and joint swellings and, although not commonly performed in first-opinion practice, is certainly achievable. This lecture will focus on simplified techniques to obtain

joint samples from common sites; specific approaches will be discussed with visual aids in the presentation itself.

## EQUIPMENT

- Aseptic preparation equipment
- Sterile gloves
- Multiple 2.5-ml syringes
- Multiple size 23-g hypodermic needles (5/8", 1", 1.5", 2")
- EDTA blood collection tubes
- Microscope slides
- Blood culture bottles (if septic arthritis suspected)

## TECHNIQUE

The technique varies significantly depending on the joints that are being sampled. However, the following points apply in all cases:

- Arthrocentesis should only be performed under heavy sedation or, preferably, general anesthesia
- A small 3 cm x 3 cm area of hair should be clipped at the site of sampling and prepared aseptically
- Surgical gloves should be worn and needles and syringes should be handled in an aseptic manner
- Once in the joint space no more than gentle suction is required, this reduces the chance of blood contamination and subsequent difficulties with cytological evaluation
- Avoid repeated redirection of the needle; if you do not get a sample easily start again with a new needle
- If frank blood is obtained, stop immediately; attempt sampling again but expect the joint to be contaminated
- If mild blood contamination occurs these samples can be submitted, however, it is important to let the cytologist know that some contamination occurred as it helps with interpretation

## SAMPLE HANDLING

- One drop of joint fluid should be smeared between two microscope slides. Both slides should be submitted
- Only two slides are necessary per joint
- If a large volume of fluid is obtained it can be submitted in EDTA for tests such as *Borrelia* polymerase chain reaction. A fresh smear should still be submitted.
- Slides should be air-dried completely before being put in a slide container

## KEY LEARNING OBJECTIVES

- Identify the common and achievable sites for obtaining samples of joint fluid
- Understand the indications and contraindications for joint sampling
- Understand the technique for obtaining and handling a joint fluid sample

## MULTIPLE CHOICE QUESTIONS

1. Which of the following statements is CORRECT regarding joint fluid samples?
  - (A) 1 ml of joint fluid should be obtained from each joint sampled
  - (B) A single joint sample is sufficient for the diagnosis of immune-mediated polyarthritis
  - (C) A single drop of joint fluid is sufficient for cytological evaluation
  - (D) Intracellular bacteria are commonly seen cytologically in septic arthritis samples
2. Which of the following is a contraindication for joint fluid sampling?
  - (A) Suspicion of septic arthritis
  - (B) Severe joint pain
  - (C) Coagulopathy
  - (D) Pyrexia greater than 40.5°C
3. Which of the following is an indication for joint fluid sampling?
  - (A) Vomiting and diarrhoea
  - (B) Generalized stiffness associated with pyrexia
  - (C) Acute-onset lameness in an otherwise well dog
  - (D) Stranguria secondary to urinary tract infection

# Stiff, painful and pyrexia: an interview with a medic, a neurologist and orthoped

**Duncan Barnes, Vicki Black and Jeremy Rose**

Pyrexia, or fever, in contrast to hyperthermia, is defined as an elevated body temperature that occurs due to alteration of the thermoregulatory set point in the anterior hypothalamus in response to endogenous or exogenous pyrogens. Pyrexia is a highly conserved physiological adaptive response that in the short term confers an evolutionary advantage, in particular when combating infectious disease. An important emphasis is approach to these cases must focus on establishing the underlying cause for

the pyrexia rather than symptomatic treatment and empirical therapy (e.g. antibiotic trials).

Pyrexia represents a challenge for the small animal practitioner, especially where signs can be vague and therefore differential diagnoses numerous. Differential diagnoses can be categorized as infectious, non-infectious inflammatory (including immune-mediated), neoplastic and miscellaneous disorders. In the approach to the pyrexia patient thorough history and clinical examination are essential. Stiff patients may present with subtle clues, for example a reluctance to climb up and down stairs or jump from furniture, or, some may present with obvious localizing signs, including neurological deficits or severe lameness (monoarticular or polyarticular).

The most common diagnoses in stiff, pyrexia patients can be divided into non-infectious inflammatory disorders including immune-mediated disease, or infectious causes.

Non-infectious inflammatory disorders to consider in the stiff, pyrexia dog depend partly on their age; in young dogs, especially those less than 6 months of age, metaphyseal osteopathy should be considered, in those less than 2 years of age steroid responsive meningitis-arteritis

is an important consideration, whereas immune-mediated polyarthritis is a disorder affecting dogs of any age, although most commonly young to middle-aged.

Septic arthritis is relatively uncommon in the absence of known trauma, or prosthesis. Discriminating between an inflammatory or septic joint is notoriously challenging due to difficulties with culturing joint fluid.

Patients affected by discospondylitis may present with pyrexia and spinal pain, or neurological deficits. Infection can be bacterial or fungal in nature, although fungal disease is uncommon in the United Kingdom (aside from systemic aspergillosis). Diagnostic investigation in these cases focuses not only on ideally procuring a sample for culture to guide therapy, but also consideration for the underlying aetiology. Described initiating factors including migrating foreign bodies (e.g. grass seeds), haematogenous spread (e.g. urinary tract infections or endocarditis), or secondary to immunocompromise.

## KEY LEARNING OBJECTIVES

- Appreciate the importance of a thorough history and clinical examination in stiff pyrexial animals
- Understand the diagnostic approach and management for the most common causes of pyrexia and stiffness

- Appreciate that despite gold-standard practice guidelines, often these cases require careful clinical judgement

## MULTIPLE CHOICE QUESTIONS

1. What is the predominant cell type on joint aspirates of a dog affected with immune-mediated polyarthritis?  
(A) Lymphocytes (C) Mononuclear cells  
(B) Macrophages (D) Neutrophils
2. Which bacterial infection typically involving the genital tract, is a consideration in approach to discospondylitis?  
(A) *Bacteroides capillosus*  
(B) *Brucella canis*  
(C) *Nocardia* sp  
(D) *Streptococcus canis*
3. Why are joint radiographs recommended in a dog diagnosed with immune-mediated polyarthritis?  
(A) To screen for ligament laxity  
(B) To assess for erosive disease  
(C) To look for concurrent stress fractures  
(D) To look for Lyme's disease

## Section IV

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# Veterinary nursing streams

Thursday 4 April

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Thursday 4 April  
Hall 9

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# (VN) Ophthalmology

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- 182 08:15–09:00  
**Common eye conditions: medical and surgical**  
Charlotte Dawson
- 183 09:10–09:55  
**Surgical preparation and instrumentation for ophthalmic patients**  
Charlotte Dawson
- 184 10:50–11:35  
**Postoperative nursing considerations for ophthalmic patients**  
Charlotte Dawson

## Common eye conditions: medical and surgical

Charlotte Dawson

Most of this first lecture is terminology and getting you used to the new words in ophthalmology. See Figures 1 and 2.

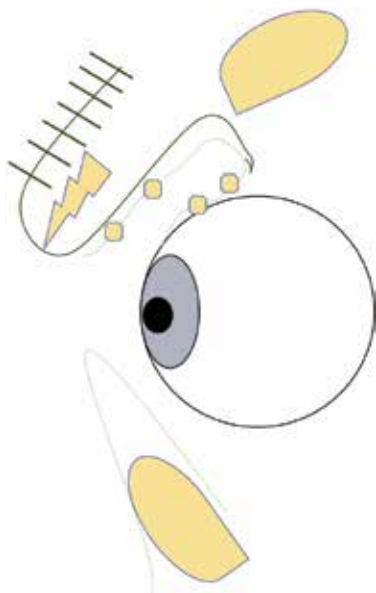


Figure 1: Eyelids and tear film

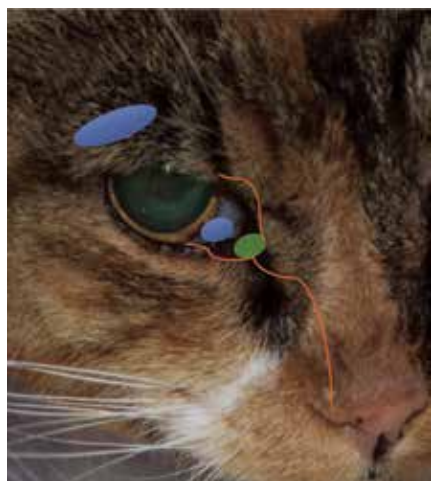


Figure 2: Nasolacrimal duct

## AGING CHANGES

It is important to know what are normal aging changes within the eyes and of these changes which ones we need to do something about and which we can monitor.

Entropion is common in elderly cats. It usually occurs at the lateral aspect of the lower eyelids and happens when they lose retrobulbar fat as they age. This causes a problem as the hairs rub on the cornea and can cause corneal ulcers. These are painful and so entropion should always be surgically corrected. This becomes a challenge when cats are elderly and have renal disease, making general anaesthesia a risk.

In older dogs we can get corneal endothelial failure. This is when the corneal endothelial cells die off over the animal's life and can no longer pump out the water. When the cornea becomes waterlogged it is oedematous. This leads to corneal ulcers, which are painful and healing can be difficult without surgery.

Another cause of blueness to the eyes is nuclear sclerosis. This is a normal aging change to the eyes and should not be confused with cataract. With nuclear sclerosis the patient can still see but the lens will have a blue colour. This is because throughout life the lens epithelial cells continue to make lens fibres. As the lens cannot expand inside the eye it compacts (like squeezing a snowball until it becomes really hard). This makes the nucleus of the lens really dense and appear blue in colour.

Cataracts are a true opacity of the lens and these come with visual deficits. Cataract surgery can be performed in some cases to help restore vision and reduce inflammation caused by the cataracts.

Senile retinal atrophy is something we usually see on retinal examination but does not cause too much of a problem for our patients. It is usually seen as thinning of the peripheral retina with some blood vessel thinning too.

## EMERGENCIES

Ophthalmic emergencies can be very dramatic. It is important to remember to check the rest of the patient before turning your attention to the eye(s). It is also important in eye cases to minimize restraint as eyes are fragile and if there are very deep ulcers or the eye is perforated, any pressure can lead to retinal detachment and loss of vision and potentially the eye.

## KEY LEARNING OBJECTIVES

- Describe the basic anatomy and physiology of the eye and identify key features in the clinical patient
- Describe and identify common clinical signs in veterinary ophthalmic patients using appropriate terminology
- Identify an ocular emergency based on owner history and physical examination

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is NOT a function of the eyelids?  
(A) Provides nutrients to the cornea  
(B) Production of tear film components

- (C) Guides tears to anterior chamber  
(D) Removal of debris from the cornea
2. Which of the following is NOT part of the uvea?
- (A) Cornea (C) Ciliary body  
(B) Iris (D) Choroid

3. What is hyphaema?
- (A) Aqueous flare  
(B) Uveal cysts  
(C) Blood in the anterior chamber  
(D) High intraocular pressure

# Surgical preparation and instrumentation for ophthalmic patients

## Charlotte Dawson

Ideally two kits are required: extraocular (adnexal) and intraocular (also used for corneal surgery). The two kits differ with regards to different sized instruments and whether the surgeon is using loupes or an operating microscope. Each kit should contain scissors, forceps, needle holders and tying forceps in addition to many other very specific instruments. You may not have come across these unless working in referral practice or alongside an ophthalmologist.

Instruments should be handled with extreme care as they are very small and delicate. They should be cleaned as soon as possible, but the tips should not be scrubbed, nor should they be allowed to touch or be dropped as they are fragile and will break. They should be allowed to air dry and be autoclaved in a box with rubber spikes to keep them apart.

The patient is positioned in sternal recumbency for eyelid and third eyelid procedures, and in dorsal recumbency for corneal and intraocular surgeries. A vacuum bag is important to make sure the patient does not move during surgery as the surgeon will be working with magnification. Diluted povidone–iodine solution (not scrub) should be made up weekly for skin disinfection. A 5% solution should be used for corneal contact and 10% for the eyelids (Figure 1). If the eye is ruptured the surgeon may not wish for any iodine to be used in case it gets into the eye.



Figure 1: Eyelid & corneal contact



Figure 2: 0.7 metric (6/0 USP) and 0.3 metric (9/0 USP) suture material

The hair should be clipped prior to performing eyelid surgery. Small clippers are usually required as large blades usually cannot get close to the eyelid due to the anatomy. Clipper blades should be clean and new to prevent clipper rash. There is no need to clip for corneal or intraocular surgeries as the hair will be draped out of the surgical field.

Suture material is very small and 0.7 metric (6/0 USP) is often used for eyelids (in big dogs, 1.5 metric (4/0 USP)) and 0.3 metric (9/0 USP) is used for the cornea (this is about as thin as a human hair so can get lost easily!). See Figure 2.

There are many different ophthalmic surgeries which will be explained in more detail in the lecture.

## KEY LEARNING OBJECTIVES

- Identify common instruments used in ophthalmic surgery and describe their cleaning and sterilization care
- Describe what materials and equipment are needed to prepare a patient for ophthalmic surgery
- Describe how to prepare a patient for ophthalmic surgery

## MULTIPLE CHOICE QUESTIONS

1. Which of the following statements is FALSE?
  - (A) Clipping for eyelid surgery is necessary
  - (B) Clipping for intraocular surgery is necessary
  - (C) Use dilute 1:50 iodine solution for corneal preparation
  - (D) Use dilute 1:10 iodine solution for eyelid surgery
2. Which of the following is NOT an eyelid surgery?
  - (A) Wedge resection
  - (B) Celsus–Hotz
  - (C) Conjunctival graft
  - (D) Medial canthoplasty
3. When would phacoemulsification be recommended?
  - (A) Treatment of cataracts
  - (B) Treatment of entropion
  - (C) Treatment of corneal ulcer
  - (D) Treatment of dry eye

# Postoperative nursing considerations for ophthalmic patients

Charlotte Dawson

Some ophthalmic patients are blind, some are painful and some are both! It is important to support them as they can be confused and scared. Speaking to them before you touch them and using your voice to help them navigate when walking around is important. It is also important that if you have picked them up or they are going onto the table that you hold them close to you so they know where you are and feel safe. They can get disorientated and feel like they will fall if you are too far away from them.


If the eye is fragile or the patient is suffering from raised intraocular pressures then pressure on the neck or jugular area is not advisable. When taking blood samples (before general anaesthesia or for making serum eye drops, for example) it is important that if the eye is fragile you use a peripheral vein.

Eyes are quite delicate structures and patients can often bump into things if they cannot see well or self-harm if the eyes are itchy. For this reason, I usually recommend Elizabethan collars, even in cats! We tie them on like a harness to help keep them in place and, generally speaking, after a few hours the patients tend to get used to them. It is also nice to have patients with a fragile eye arrive at the referral hospital with a collar on so that the eye can be protected on the way in the car (or train etc.). Harnesses are used for walking dogs postoperatively and for those with raised intraocular pressures (glaucoma), for the reasons discussed above. Signs of a ruptured or leaking eye are: profuse tearing/wetting, blood coming from the eye, vocalizing, and marked blepharospasm/squinting.

## HOW LONG BETWEEN MEDICATIONS

- Drops are aqueous or suspension and ointments are 'oily'
- Drops should be given first before ointments where possible
- Leave 10–15 minutes between drops
- Leave 30 minutes after giving an ointment

See Figure 1.



### Daily Medication Schedule

Date: \_\_\_\_\_

		AM						PM					
		Time											
MEDICATION	STRENGTH												
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Name: \_\_\_\_\_

If you have any queries or concerns about your pet's medication, please contact us on 01707 646366.

Queen Mother Hospital for Animals,  
The Royal Veterinary College,  
University of London,  
Hawkshead Lane  
North Mymms  
Herts  
AL9 7TA  
Tel: +44(0) 1707 646366  
Fax: +44(0) 1707 649384  
Email: qmhreception@rvc.ac.uk

Figure 1: Example of a daily medication schedule

## WHAT TO EXPECT AFTER SURGERY OR DURING MEDICAL MANAGEMENT FOR OPHTHALMIC DISEASES

- Redness – this is to be expected as it is a sign of inflammation, it should be gradually decreasing with time and not becoming more obvious
- Blueness – this is corneal oedema and depending on the type of surgery should again be decreasing with time
- Blackness – this can be more challenging as it could be a sign of a perforation and iris coming out, or can be pigment and not too much to worry about
- Squinting – again this should be decreasing with time, we generally say if the eye is becoming more uncomfortable, or is being held closed for more than part of the day (i.e. a morning or afternoon etc.) the patient should be checked
- Discharge – this should be decreasing, becoming clearer, less mucopurulent and maybe pinkish in colour (again depending on the type of surgery or disease)

Owners should be told to contact someone if they are at all concerned, as eyes can go downhill quickly.

## KEY LEARNING OBJECTIVES

- Describe how to deliver optimal nursing care for veterinary ophthalmic patients and create appropriate nursing care plans

- Advise clients on common ophthalmic medications and how they should be used
- Be able to give advice on an appropriate medication schedule for discharged patients

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is NOT a sign of globe rupture?  
(A) Profuse tearing  
(B) Corneal oedema (blue cornea)  
(C) Blood coming from the eye  
(D) Marked blepharospasm
2. Which of the following is a topical antibiotic?  
(A) Chloramphenicol  
(B) Ciclosporin  
(C) Dexathemason  
(D) Dorzolamide
3. How long should be left between administration of eye drops (not ointment)?  
(A) 1–2 minutes  
(B) 5–10 minutes  
(C) 10–15 minutes  
(D) 30+ minutes



Thursday 4 April  
Hall 9

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## (VN) Neurology

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- 188 11:45–12:30  
**Nursing the brain injury patient**  
Holly Smith
- 188 13:50–14:35  
**Nursing and rehabilitating patients with neuromuscular disease**  
Joe Fenn
- 189 14:45–15:30  
**Rehabilitation post spinal injury**  
Holly Smith

# Nursing the brain injury patient

Holly Smith

Nursing a patient with a traumatic brain injury, inflammatory brain and brainstem condition or following a craniotomy is often seen as problematic. There are some common nursing observations and treatments for most brain patients. These patients are in the general neurology ward and out of the intensive care ward where they would have been immediately post trauma or surgery.

The patient's mentation and response are very important and need to be closely observed and recorded in the initial recovery period. The Modified Glasgow Coma Scale can be used for giving this a 'score', or certain responses can be listed and recorded on a kennel sheet. As long as the same responses and observations are made each time to achieve consistency, any deterioration in the patient can be picked up quickly and reported to the veterinary surgeon. If a Coma scale is not used or available then making sure the basic checks are done is imperative (Figure 1).

Some patients with brain injuries or post brain surgery can have expected behaviour which can be misconstrued as an emergency or deterioration. An example of this would be compulsive pacing or circling, vocalization or being absent (not themselves), but will still interact to go for a walk, eat or drink. As long as these behaviours are noted, with the same checks being carried out at regular intervals, they can be seen as 'normal' for that stage in the patient's recovery.

Many conditions have common behaviours associated with them. For example craniotomy patients will often have poor depth perception which makes eating and drinking more challenging and will mean they bump into doors and walls more frequently.

Inflammatory brain conditions will often result in a patient needing to walk alongside a wall on the same side, trying to move them to the opposite side or along an area with no wall will mean they become unable to continue. They may stop, veer off in one direction or circle.

### Level of consciousness

Response to calling name, touch and interaction

### Motor function

Head carriage (turn, tilt, tremors, low), body shape (curved, twisted, rigid limbs)  
Ability to stand or walk

### Brainstem

Pupil size is equal and there is a pupillary light reflex present and is it equal bilaterally  
Continuing to eat and drink normally (swallowing and gag reflex unchanged)

Figure 1: Essential basic checks for the brain injury patient

## KEY LEARNING OBJECTIVES

- Understand how to monitor a brain injury patient in the general ward environment
- Differentiate between expected behaviour and possible signs of deterioration
- Observations to check and record for continuity of care

## MULTIPLE CHOICE QUESTIONS

1. Which scale is used to record neurological status?  
(A) Universal Coma Scale  
(B) Glasgow Coma Scale  
(C) Small Animal Coma Scale  
(D) Modified Glasgow Coma Scale
2. Which three areas does the coma scale grade?  
(A) Nerve, muscle and bone  
(B) Brainstem, motor function and level of consciousness  
(C) Pupils, limbs and behaviour  
(D) Eating, drinking and sleep
3. What is likely to cause eating and drinking to be a challenge post surgery?  
(A) Lack of depth perception  
(B) Inability to open jaw  
(C) Absent episodes  
(D) Unable to stop pacing/circling to eat or drink

# Nursing and rehabilitating patients with neuromuscular disease

Joe Fenn

Neuromuscular diseases include any condition that either primarily or secondarily affects the peripheral

and cranial nerves (neuropathies, such as canine acute idiopathic polyradiculoneuritis), neuromuscular junctions (junctionopathies, such as myasthenia gravis) or muscles (myopathies, such as immune-mediated polymyositis). Regardless of the specific diagnosis or category of neuromuscular disease, these patients typically present with characteristic clinical signs that underscore their particular nursing and rehabilitation requirements. The typical signs often seen in neuromuscular disease pertinent to their supportive care needs include marked weakness, exercise intolerance, regurgitation, hypoventilation, urinary incontinence and severe muscle atrophy.

The most severely affected patients with neuromuscular disease may have weakness of vital respiratory muscles, which may be a particular concern in the acute



phase of management. In these cases, it is vital to monitor patient respiratory parameters, including physical assessments, such as thoracic auscultation, respiratory rate and effort, as well as pulse oximetry and blood gas analysis. Any evidence of reduced chest wall excursions or an abdominal breathing pattern should be acted on promptly as this may indicate hypoventilation and signal the requirement for mechanical ventilation.

Patient positioning is a key nursing consideration, particularly as patients with neuromuscular disease can rapidly lose large amounts of muscle mass making them especially vulnerable to pressure sores whilst recumbent. Non-ambulatory neuromuscular patients should be turned every 4 hours, ideally also spending time in sternal recumbency. It is vital that appropriate bedding is used and changed frequently, to minimize the chance of urine scald. Appropriate bladder management is particularly vital to minimize the risk of complications such as urinary tract infections. Neuromuscular patients will typically present with a 'lower motor neuron' bladder and may therefore be prone to leaking urine between expressions. Another important consideration in the nursing care of patients with neuromuscular disease is meeting their nutritional demands. Some patients may experience difficulties with food intake, such as dogs with myasthenia gravis that often develop megaesophagus, leading to persistent and debilitating regurgitation. In these cases, appropriate feeding protocols and equipment must be in place to allow feeding from a height and regular monitoring for evidence of regurgitation or the development of aspiration pneumonia.

Physical therapy and rehabilitation should be at the forefront of the management plan for any patient with neuromuscular disease, regardless of the specific diagnosis. Due to the rapid loss of muscle mass and tone, maintaining muscle function through regular exercises, such as massage, passive range of motion (PROM) and strengthening exercises, is essential. As the patient's strength increases, more independence is encouraged, and a gradual transition to a home exercise protocol may be performed. As an addition to physical therapy techniques that can be used on wards and at home, hydrotherapy can also be hugely beneficial in supporting the recovery and muscle strengthening of neuromuscular patients.

Successful nursing and rehabilitation of the patient with neuromuscular disease therefore depend on effective

collaboration between nurses, clinicians and owners. Although often challenging and time consuming, if performed well, the care of these patients can be incredibly rewarding and effective.

## KEY LEARNING OBJECTIVES

- To describe the characteristic clinical signs of patients with neuromuscular disease, including marked and rapid loss of muscle mass and tone
- To recognize the prolonged and intensive physical rehabilitation and nursing requirements of neuromuscular patients
- To understand the diagnosis and management of potential life-threatening complications associated with severe neuromuscular disease, including aspiration pneumonia and respiratory dysfunction

## MULTIPLE CHOICE QUESTIONS

1. Which of the following conditions is most commonly associated with megaesophagus and regurgitation in dogs?
  - (A) Canine acute idiopathic polyradiculoneuritis
  - (B) Myasthenia gravis
  - (C) Diabetic polyneuropathy
  - (D) Muscular dystrophy
2. Which of the following types of medication is most often used to treat dogs with acquired myasthenia gravis?
  - (A) Non-steroidal anti-inflammatory drugs
  - (B) Neuromuscular blocking agents
  - (C) Antibiotics
  - (D) Acetylcholinesterase inhibitors
3. A 'lower motor neuron' bladder in patients with neuromuscular disease is characterized by what features?
  - (A) Turgid bladder, but easy to express
  - (B) Flaccid bladder, but difficult to express
  - (C) Flaccid bladder, easy to express
  - (D) Turgid bladder, difficult to express

# Rehabilitation post spinal injury

**Holly Smith**

Spinal injuries can be varied, surgical and non-surgical. The rehabilitation plan will have to take into consideration whether surgery was needed, the severity of the injury, where the injury is and how severely the patient is affected. The location of the injury will dictate how many limbs are affected.

Common surgical spinal injuries include:

- Fractured or luxated vertebra
- Intervertebral disc extrusion
- Atlantoaxial subluxation

Common non-surgical spinal injuries include:

- Acute non-compressive nucleus pulposus extrusion
- Fibrocartilaginous embolism

Rehabilitation can be divided into three sections:

- Hospitalization – accommodation
- Essential care – bladder, bowel, skin, respiratory, nutrition
- Rehabilitation – physiotherapy, hydrotherapy

HOSPITALIZATION

If the patient is paraplegic, tetraplegic, paraparetic or tetraparetic they will need a mattress and soft bedding. Thought must go into the bedding depending on whether the patient can urinate, move away from their urine or has a urinary catheter in place. Bedding that wicks away fluid from the patient on to the backing is ideal.

Pain should be assessed, especially in the early stages.

ESSENTIAL CARE

This is making sure the whole patient is cared for, not focusing solely on their spinal injury and rehabilitation (Figure 1). Ensuring adequate calorie intake is essential to recovery, to prevent weight loss, other than that due to muscle wastage.

Being aware of possible complications is key to early treatment and reducing the risk of occurrence, as prevention isn't always possible or realistic. Using indwelling urinary catheters with a closed collection system instead of manual expression will prevent urine scalding, over-distension or rupture. An associated complication of indwelling catheters is an ascending urinary tract infection. Using barrier creams, sprays to protect the skin, frequent baths and assisted walking outside to encourage urination are all ways to try to prevent urine scalding. The same can be said for faecal scalding. Catheters can be used per rectum with a closed collection system in cases of severe diarrhoea.

Bladder
Urinary tract infection
Urine scalding
Incontinence
Over-distension
Rupture
Bowel
Faecal scalding
Incontinence
Diarrhoea
Constipation
Skin
Urine, faecal scalding
Decubital ulcers
Respiratory
Hypostatic pneumonia
Aspiration pneumonia
Nutrition
Weight loss

Figure 1: Possible complications for the spinal injury patient

Passive	Active assisted	Active
Effleurage	Supported standing	Standing
Petrissage	Rhythmic stabilization	Rhythmic stabilization
Flexion, extension	Foot slides	Baiting
Passive range of motion	Range of motion	Sit to stands
	Baiting	Hydrotherapy
	Half sit to stands	Walking
	Harness walks	

Figure 2: Physiotherapy for the spinal injury patient

Frequent turning and offering food or water in a sternal position will prevent both hypostatic and aspiration pneumonia.

REHABILITATION

Both physiotherapy and hydrotherapy are essential for achieving the best recovery and function for spinal injury patients. Physiotherapy can be divided into three categories (Figure 2). Each patient should have their physiotherapy plan assessed each day and altered as their condition changes.

KEY LEARNING OBJECTIVES

- Understand how to assess a spinal injury patient to plan rehabilitation and prevent complications
- Awareness of surgical and non-surgical conditions
- Understand different categories of physiotherapy

MULTIPLE CHOICE QUESTIONS

1. What complication is most associated with an indwelling urinary catheter?  
(A) Cystitis  
(B) Ascending urinary tract infection  
(C) Urethral stricture  
(D) Bladder rupture
2. What are the categories of physiotherapy?  
(A) Massage, walking and hydrotherapy  
(B) Turning, shaking and vibrating  
(C) Passive, active assisted and active  
(D) Active and hydrotherapy
3. Which of the following are non-surgical spinal injuries?  
(A) Acute non-compressive nucleus pulposus extrusion and fibrocartilagenous embolism  
(B) Intervertebral disc extrusion and atlantoaxial subluxation  
(C) Fibrocartilagenous embolism and intervertebral disc extrusion  
(D) Spinal fracture and acute non-compressive nucleus pulposus extrusion

Thursday 4 April  
Hall 10

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## (VN) Consultations

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- 192 08:15–09:00  
**Surgical nursing clinics**  
Nicola Ackerman
- 192 10:50–11:35  
**How to implement running a clinic**  
Helen Tottey
- 193 11:45–12:30  
**How to do more clinics**  
Helen Tottey
- 194 13:50–14:35  
**Communication skills for consulting nurses**  
Helen Tottey
- 195 14:45–15:30  
**Medical clinics: what can we be doing?**  
Nicola Ackerman

# (VN) Consultations

## Surgical nursing clinics

Nicola Ackerman

As with medical nursing clinics, the Registered Veterinary Nurse (RVN) can be greatly utilized in undertaking a range of procedures that can aid in a number of positive outcomes for the RVN, the pet, the client and the business as a whole. RVNs need to adhere to the Royal College of Veterinary Surgeons' (RCVS) Code of Professional Conduct and the Veterinary Surgeon's Act (VSA).

Surgical nursing clinics should include postoperative checks, wound management, assessment of wounds/trauma prior to repair, dentistry checks (routine and post procedure), presurgical discussions with clients and, of course, admissions for surgical procedures. Some practices will also have a dedicated person/team that will only book in all surgical procedures. These nurses will discuss the procedure, options such as preanaesthetic bloods, fluid therapy etc. This is to ensure that informed consent is gained and to help speed up admission times.

Nursing clinics that look at postoperative checks are a good starting point. Utilization of resources such as <https://vetaudit.rcvsk.org/poc/> can help give guidelines to RVNs. Clinical audits on postoperative neutering checks include classification of outcomes. Practice protocols can be set around these outcomes; for example, any animals in Group 1 or 2, would not require referral. Group 3 and above would. Use of digital photography should be used in recording any complications. This is similar to all wound-management cases.

- Group 0: lost to follow-up (when follow-up was expected)
- Group 1: no complication reported
- Group 2: complications noted but no treatment required
- Group 3: complications noted but only medical treatment was required

- Group 4: complications noted and surgical treatment was required
- Group 5: the animal died

### KEY LEARNING OBJECTIVES

- Understand what RVNs can undertake in surgical clinics in accordance with the Veterinary Surgeon's Act and the Professional Code of Conduct
- How to assess wounds and recording of wounds on practice management systems
- Use of clinical audits in nurse clinics to improve surgical outcomes

### MULTIPLE CHOICE QUESTIONS

1. Who can undertake surgical clinical audits in practice?
  - (A) RVNs
  - (B) Veterinary surgeons
  - (C) Anyone
  - (D) Only those that have additional qualifications
2. If you are unsure about the progression of a wound and the veterinary surgeon isn't available for advice, what should you do?
  - (A) Take a picture of the wound, with the client's permission
  - (B) Write very detailed clinical notes
  - (C) Refer the pet back to the veterinary surgeon for when you know they will be available
  - (D) All of the above
3. What acts of surgery can RVNs undertake?
  - (A) Minor surgery not involving entry into a body cavity
  - (B) Dentistry
  - (C) Castrations
  - (D) None of the above

## How to implement running a clinic

Helen Tottey

There are many challenges facing veterinary practices. With reports showing declining pet numbers and the increase in veterinary practices for those owners with pets to choose to use, today's veterinary practice needs to offer more than just clinical care to patients to attract them through their door. And then once the client is in your practice they will be looking for a great overall experience of care for them and their pet and if this doesn't match their expectations, they will leave and go to another veterinary practice. It is widely recognized that nurse consultations are an important part of what veterinary practices offer to their clients to provide a more well rounded approach to pet care than just clinical care.

However not all veterinary practices offer this valuable service; or if they do, there is often reports of them not being successful for various reasons. To implement successful nurse consultations it is important to first look at (or be reminded about) why you want to offer the consultations. When we know why we are doing this, the next step is to ensure the whole team know why. Without a cohesive team approach, nurse consultations will struggle to be successful. Only when the whole team understands the benefits and how the consultation structure will work in the practice can we then look at how to start implementing them so that they become an integral part of what the veterinary practice offers their clients, the team and, most importantly, the pets and their owners.

This lecture will be suitable for registered veterinary nurses, student veterinary nurses, anyone with an interest in implementing nurse consultations 'from scratch', or anyone working in a practice that already offers this service and would like to understand more about the benefits these bring to the veterinary team and pet owner.

## KEY LEARNING OBJECTIVES

- Why nurse consultations are of benefit to the pet, the owner, the business and you
- How to ensure the whole veterinary team can promote the benefits to clients
- How to help new team members learn the value of nurse consultations, ensuring continual success even when team members change

## MULTIPLE CHOICE QUESTIONS

1. Why should we offer nurse consultations?
  - (A) They benefit the pet and owner
  - (B) They benefit the business
  - (C) They benefit the team
  - (D) All of the above

2. What is needed for nurse consultations to be successful?
  - (A) Only the nursing team need to be involved
  - (B) You need your own consulting room
  - (C) The times and days can change to suit the veterinary rota
  - (D) The whole practice team must understand the value of them and promote them
3. What can nurse consulting help with?
  - (A) Continuity of care
  - (B) Educating pet owners in preventative healthcare
  - (C) Supporting pet owners after a clinical diagnosis
  - (D) All of the above

# How to do more clinics

## Helen Tottey

Following the previous lecture on Setting Up Nurse Consultations, this lecture will look at what topics you can add to help owners care for their pets so that:

- Clients value them and attend
- You are confident in delivering them
- Pets receive all-round care from the veterinary practice team

With many different consultation topics it will be impossible to talk about how to implement each one during this lecture. But when a new topic is chosen, there is a process that should be followed that will ensure this becomes a successful addition to what you offer to your clients, their pets and the veterinary business. One of the first questions in the process that should be answered is why – why do you want to offer a certain topic? Sometimes the enthusiasms of the nursing team to provide consultations covering a topic are not as well received by the clients with the pets we are trying to help as we would like, and this can result in reduced numbers of pets attending. We will look at how you can ensure what you want to offer will be valued by your clients so that they bring their pets along to see you.

As well as the clients and their pets, it is also important to demonstrate to the managers and owners of the veterinary practice that your new consultation will be of value to the business. We will look at how SMART objectives can help you present your case to your management team to get your consultation up and running. During this lecture we will use the example of how the first vaccination can be a nurse-led appointment that allows:

- The nurse to start building a trusting relationship with the client

- The client to build trust in the nursing team at a time they need a lot of help and support
- The veterinary surgeon to reduce the time spent in a first vaccination appointment so they are free to see clinical cases

The same principles can be applied for all consultations that require the veterinary surgeon to be involved, such as seniors and any medical management cases.

This lecture will be suitable for registered veterinary nurses, student veterinary nurses, or anyone with an interest in implementing nurse consultations 'from scratch' or for anyone working in a practice that already offers this service and would like to understand more about the benefits these bring to the veterinary team and pet owner.

## KEY LEARNING OBJECTIVES

- How to find out if there is a need for your chosen nurse consultation topic
- Using the SMART acronym to help you achieve your objectives
- How you can work alongside the veterinary surgeon in a first vaccination appointment to help build a relationship and trust with the pet owner so it will be more normal for them to seek your help and advice in future

## MULTIPLE CHOICE QUESTIONS

1. What does the M in SMART acronym stand for?
  - (A) Merchandise
  - (B) Medicine
  - (C) Measurable
  - (D) Money
2. It is important to find out if there is a need for your chosen consultation topic from your clients. How can you do this?

# (VN) Consultations

- (A) Diary analysis
  - (B) A client survey emailed
  - (C) Asking clients on Facebook
  - (D) All of the above
3. As a professional you should do which of the following?

- (A) Not charge for your consultations
- (B) Ask for a donation only
- (C) Feel confident charging for your time, expertise and skill
- (D) Only charge if you have done something to the pet (e.g. clip nails)

## Communication skills for consulting nurses

**Helen Tottey**

The previous lectures in this series on nurse consultations have looked at why nurse consulting is important for the veterinary team, the client and the pet, what should be considered before starting to offer nurse consulting, the types of consultations that can be offered and how to add new topics. This final lecture will look at the communication skills required to ensure that when the client and pet are in the room with you, both you and the client communicate effectively for the benefit of their pet.

While studying to become a veterinary nurse, there is very little time spent teaching student nurses about consulting. Compare this to veterinary students, who spend a lot of time observing consultations while 'seeing practice'. It can be challenging to find yourself in a consulting room with a client and expected to be able to 'consult' without any prior training. However, as a veterinary nurse, we all experience clients who turn to us to help interpret what the veterinary surgeons has told them so we do know how to explain clinical jargon in a way that the owner can understand. These are not the only type of skills required in the consulting room, however.

During the consultation you need to find out the reason for the visit, examine the pet, make recommendations and finalize an agreed plan, often in a fixed time which adds pressure and can make all these seem difficult to achieve. Luckily there is an evidence-based structure to a consultation that, when followed, addresses all the requirements of the consultation helping it to go smoothly for the benefit of all those in the room.

As well as this structure, listening to clients is one of the fundamental requirements of consulting and, although we all have the ability to listen, this is not always accomplished in the consulting room. Listening skills are an important part of the consultation but it is not just something for our ears nor is it only what the client tells you, it is also what isn't said that needs to be 'heard' if you are going to make the right plan for the client and their pet to ensure compliance. This lecture will introduce

the Calgary Cambridge Principles of the structure of a consultation and explore the importance of listening skills required to ensure a successful outcome to your consultation and help to build your confidence in offering nurse consultations.

This lecture will be suitable for registered veterinary nurses, student veterinary nurses or veterinary surgeons who want to learn about the structure to a consultation.

### KEY LEARNING OBJECTIVES

- The importance of listening to ensure the clients' needs are fully understood to reduce misunderstandings
- The Calgary Cambridge Principles to help structure the consultation to help formulate an agreed treatment plan
- Developing skills for consulting to help build confidence for the nurse delivering the consultation so that it is an enjoyable part of the veterinary nursing role

### MULTIPLE CHOICE QUESTIONS

1. What is the evidence-based structure to a consultation called?
  - (A) Calgary Nottingham Principles
  - (B) Calgary Cambridge Principles
  - (C) Calgary Sussex Principles
  - (D) Calgary Edinburgh Principles
2. Which of the following is true about having a structured consultation?
  - (A) Isn't important
  - (B) Is only for vets
  - (C) Helps build rapport and trust with the owner
  - (D) Is only needed if you want a client to buy a product or service
3. What do good listening skills require you to do?
  - (A) Maintain eye contact
  - (B) Keep an open mind and not pre-judge
  - (C) Ask clarifying questions to check your understanding
  - (D) All of the above

# Medical clinics: what can we be doing?

**Nicola Ackerman**

Client education, increasing compliance and improving quality of life are all important elements of medical nursing clinics. Good understanding of the roles and tasks that registered veterinary nurses (RVNs) can undertake can help in the development of these clinics in general practice.

Practices that have written protocols or guidelines to follow have better continuity of care, which really benefits the patient, the owner and the care givers. If each specific medical case has guidelines, for example a diabetic cat, everyone involved knows what recommendations to give, which insulin to use, when to review the case etc. This means that, during the medical nurse clinic, the RVN knows what to say and there is no mis-communication. Having these protocols or guidelines is key to medical clinics.

All clients with a pet that has been diagnosed with a medically managed disease, should be recommended a nurse clinic. Specifics to be discussed in the clinic will include: client understanding, medications (administration and importance of compliance with the veterinary surgeon's recommendations), diet, correct weight and lean muscle mass balance, environmental factors, behaviour, on-going management and monitoring of the disease.

Collation of diagnostic results is a major part of medical clinics. Blood tests need to be requested by the veterinary surgeon, but can be delegated to the RVN to perform in the clinic. Routine, regular blood tests can be performed by the RVN, with the results being interpreted by the veterinary surgeon. Reporting of the interpretation can be made by the RVN.

## KEY LEARNING OBJECTIVES

- Understand what registered veterinary nurses can undertake in clinics in accordance with the Veterinary Surgeon's Act and the Professional Code of Conduct
- What diagnostic tasks can be undertaken in clinics
- How medical nursing clinics can increase compliance, the animal's quality of life and revenue

## MULTIPLE CHOICE QUESTIONS

1. When can diagnostic tests, such as blood tests, be performed in nurse clinics?  
(A) If requested by the owner  
(B) If recommended by the RVN  
(C) If delegated by the veterinary surgeon to be taken  
(D) RVNs can't take blood samples
2. Changes to medications that are POM-Vs, for example dose rate or form (liquids to tablets), can only be performed by whom?  
(A) The veterinary surgeon  
(B) The RVN  
(C) The client  
(D) Receptionists
3. What do written protocols and/or guidelines for specific disease processes that RVNs can follow in clinics help?  
(A) In the overall welfare of the patient  
(B) Increased revenue to the practice  
(C) Better compliance from all involved  
(D) All of the above





Thursday 4 April  
Hall 11

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# (VN) General nursing

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- 198 08:15–09:00  
**Mentoring and supporting students**  
Andrea Jeffery and Paula Hotston Moore
- 198 09:10–09:55  
**Infection control: a challenge for the whole team**  
Louise O'Dwyer
- 199 10:50–11:35  
**Lungworm: should we be worried?**  
Emily Thomas
- 200 11:45–12:30  
**Where have all the nurses gone and why are they leaving?**  
Andrea Jeffery
- 201 13:50–14:35  
**Nursing and treatment options for the hyperthyroid cat**  
Suzanne Rudd
- 202 14:45–15:30  
**Ill communication: effective team handovers**  
Louise O'Dwyer

# Mentoring and supporting students

**Andrea Jeffery and Paula Hotston Moore**

Mental health is at the forefront of all educational establishments. It is well recognized that students require support in both their academic needs and their mental health needs, to both guide them through their studies and in preparation for the working environment. At one time or another, most of us will experience a period of stress in our lives. How we deal with that stressor, what we glean from it, how we cope with it and build up resilience and move forwards towards the future determines how prepared we will be for future stressors that come our way. Students need mentoring and supporting to prepare them for such situations and guide them into getting the necessary support so that they can continue with their studies and develop as a person.

Students benefit from having someone who is familiar to them and experienced either in the workplace or in the educational establishment, to whom they can turn to for advice. It is not this person's role to solve all their problems but rather to support the student and to offer guidance from where to best seek further help. Students need a listening ear, someone in whom they trust, and someone who will treat them with respect.

Support and mentoring can be offered in a variety of ways. Students will constantly learn from experiences happening around them and therefore the working and educational environment must be a supportive one. Somewhere where the student feels safe and is readily able to learn from role models, other staff and students in a supportive and nurturing environment is one that will teach the student much about life as well as about the veterinary industry. A busy college or university or veterinary practice needs to fulfil its job in caring for patients or in teaching together with nurturing and supporting students in its everyday life. Working in an environment that is supportive is important for everyone, not solely for students. Support should be at the core of everything that is done; indeed, various social media platforms have done much to raise awareness of such issues in the veterinary practice.

How to support and mentor students in everyday life as well as in times of poor mental health will be explored and discussed further during this lecture.

## KEY LEARNING OBJECTIVES

- To recognize why students need mentoring and support
- To describe the qualities someone supporting students should have
- To illustrate how students can be mentored and supported in education and in the workplace

# Infection control: a challenge for the whole team

**Louise O'Dwyer**

Infection control is a vitally important consideration for the whole of the practice, but technicians can play an instrumental role in its implementation. As with human healthcare facilities, veterinary practices face similar challenges with hospital-acquired infections (HAIs). For veterinary practice, the close contact between people and their pets allows the transmission of infectious agents between humans and animals, and in both directions. As a result, many of the commonly seen HAIs in human hospitals are now seen in veterinary hospitals.

Commonly encountered HAIs include:

- Intravenous catheter infections
- Surgical site infections
- Pneumonia
- Urinary tract infections

In high-risk patients, a high index of suspicion should be maintained. In patients developing clinical signs of HAI, careful evaluation should be performed for identification of an underlying source.

## PREVENTING HAIS

Complete prevention of HAIs is impossible, but the inclusion of strategies aimed at limiting infection should be present in all hospital situations. There is no current evidence base on which to base these in the current veterinary literature, although there is a wealth of information in the human field. Multiple interventions applied at the same time will be more efficacious than single interventions, although implementation of this can be difficult.

The following interventions should be considered within the hospital environment for the prevention of HAIs:

- Hand hygiene
- Environmental cleaning and disinfection
- Isolation and barrier nursing
- Antimicrobial stewardship

## Environmental cleaning and disinfection

Gloves and appropriate personal protective equipment (PPE) should be worn whenever using disinfectants. Additional PPE should be worn if there is the probability of splash from contaminated surfaces or disinfectants. Gross contamination will inactivate most disinfectants. Wash the area with water and detergent or soap; scrubbing or mechanical disruption is necessary to break down biofilms and residual debris that prevent or inhibit the proper disinfection process. Rinse the cleaned area to remove any detergent residue as detergents may

inactivate some disinfectants. Allow area to drain or dry as much as possible to prevent dilution of disinfectants.

### Isolation and barrier nursing

Guidelines for isolation and barrier nursing should be present in all large practices and should be considered for any busy emergency practice. These aim to protect staff, the patient and other patients from the risk of acquiring infectious disease. High-risk patients or those that have a HAI should be nursed appropriately to prevent the spread of infection. Considerations for the individual patient should include the risk to other patients which will depend on the agent and the severity of the patient's clinical status. Protective clothing should be available for veterinary personnel dealing with the patient.

### CONCLUSIONS

Biosecurity and infection control are major considerations within veterinary hospitals. Biosecurity policies and procedures should be developed in each hospital to reduce the risk of all nosocomial and zoonotic illness. All staff should be trained and confident in ensuring strict adherence to biosecurity and infection-control protocols.

### KEY LEARNING OBJECTIVES

- Understand the underlying principles behind infection control

- Recognize the commonly encountered hospital-acquired infections and how their incidence can be minimized
- Gain an improved knowledge in dealing with patients in isolation and barrier nursing techniques

### MULTIPLE CHOICE QUESTIONS

1. When is reduced compliance with hand hygiene protocols seen?
  - (A) During busier periods
  - (B) When new products are introduced
  - (C) When hand hygiene auditing is being performed
  - (D) When only hand gels are available
2. When should gloves ideally be changed?
  - (A) Moving from contaminated areas to clean areas on the same animal
  - (B) Moving from dirty to clean procedures on the same animal
  - (C) Between individual animals
  - (D) All of the above
3. Which of the following describes cleaning and disinfection?
  - (A) Remove organic debris
  - (B) Protects organisms
  - (C) Decreases contamination by at least 90%
  - (D) All of the above

## Lungworm: should we be worried?

Emily Thomas

*Angiostrongylus vasorum* is an emerging and important parasite in dogs in the UK that can cause fatal disease if left untreated. It is endemic in southeast England and south Wales, and has been reported as far north as Scotland. Distribution is patchy, but prevalence and spread have increased in recent years.

The intermediate hosts are slugs and snails, which are ingested by the dog. After ingestion the larvae move through several life cycle changes, ending up as adults in the right side of the heart and pulmonary vasculature. Here the adults lay eggs that develop into larvae which migrate to the alveoli and are coughed up, swallowed, and eventually shed in faeces. Molluscs are infected by environmental contact, and the life cycle begins again.

### CLINICAL SIGNS

*Angiostrongylus vasorum* can cause a range of clinical signs in dogs, with disease varying from life threatening to subclinical. Pulmonary inflammation may result in coughing, exercise intolerance or respiratory distress. Approximately one-third of patients present with a coagulopathy.

This may cause clinical signs including spontaneous bleeding, excessive bleeding after surgery, or neurological signs secondary to bleeding into or around the brain and/or spinal cord.

### DIAGNOSIS

The IDEXX Angio Detect® test is a rapid, in-house test that detects an antigen released by the adult nematode. Its sensitivity and specificity are good, but there is still a risk of false-negatives, particularly early during infection. Faecal smear evaluation is a rough and ready test that might be useful when client finances are limited. The smear is made by mixing a small quantity of faeces with a drop of tap water on a slide, and examined under x10 magnification for larvae (<https://www.youtube.com/watch?v=HMjzUNB1Lpl>). The test has low sensitivity but very high specificity, i.e. there is a risk of false-negatives. Faecal samples can also be submitted for Baermann analysis. Larval shedding can be intermittent, so ideally a 3-day pooled sample is submitted. Diagnosis can also be made from cytology of bronchoalveolar lavage fluid, but this procedure is costly and carries risks in patients with respiratory compromise.

Coagulation testing can be useful, including a platelet count and, when available, prothrombin and activated partial thromboplastin times. However, there is no consistent pattern of coagulation test abnormalities characteristic for the parasite.

# (VN) General nursing

## TREATMENT

Initial stabilization for severely affected patients may include oxygen supplementation for dyspnoea, fluid bolus treatment for hypovolaemia, transfusion of packed red blood cells to replace significant blood loss, and/or plasma transfusions for patients with abnormal clotting times and clinical bleeding.

Two products are licensed to treat angiostrongylosis in the UK: imidacloprid/moxidectin spot-on (Advocate™) and milbemycin oxime/praziquantel (Milbemax). Spot-on treatment is particularly useful for dyspnoeic patients where tablet administration may exacerbate respiratory distress. In patients with severe respiratory compromise, death of the adult parasites may exacerbate inflammation. In these cases, an anti-inflammatory dose of dexamethasone could be considered.

## PREVENTION

Regular usage of the products listed above can prevent infection. Clients can minimize environmental contamination by appropriate disposal of dog faeces.

## KEY LEARNING OBJECTIVES

- Describe key clinical signs associated with *Angiostrongylus vasorum* infection
- List appropriate diagnostic tests with the pros and cons of each
- Outline the initial stabilization and subsequent treatment of angiostrongylosis

## MULTIPLE CHOICE QUESTIONS

1. What is the most likely cause of neurological signs that are occasionally seen in patients with angiostrongylosis?
  - (A) Bleeding into the nervous system caused by coagulopathy
  - (B) Hypercalcaemia
  - (C) Increased circulating ammonia due to hepatic involvement
  - (D) Toxin released by adult worms
2. Which in-house test is appropriate for diagnosis of *Angiostrongylus vasorum* infection?
  - (A) Blood smear examination
  - (B) Commercially available enzyme-linked immunosorbent assay (ELISA) detecting circulating antigen
  - (C) In-saline agglutination test
  - (D) Real-time polymerase chain reaction (PCR) assay
3. What is the most appropriate treatment for a patient with severe respiratory distress caused by *Angiostrongylus vasorum*?
  - (A) Dexamethasone
  - (B) Fenbendazole
  - (C) Imidacloprid/moxidectin spot-on
  - (D) Potentiated amoxicillin

# Where have all the nurses gone and why are they leaving?

## Andrea Jeffery

Where are all the nurses going and why are they leaving? The aim of this lecture is to discuss the key factors which influence retention within the veterinary nursing profession and discuss a set of recommendations relating to these. There has, for a period of time been anecdotal evidence that recruitment of registered veterinary nurses (RVNs) has been difficult and that a significant number of veterinary nurses are leaving the profession year on year. The session will review current evidence surrounding the loss of RVNs and those who have indicated an intention to leave the profession and consider the factors which influence this.

The lecture will go on to highlight the factors which are important to the many nurses who remain in the profession and how we as a profession can influence change. The VN Futures initiative and how the voice of the profession was the driving force behind it will be discussed. The lecture will also cover the proposed structure of the new post-registration qualification and its accessibility to all RVNs, as well as the rationale for the change to the current RCVS Diploma in Advanced Veterinary Nursing and how the need for this became apparent.

## KEY LEARNING OBJECTIVES

- The three key factors which influence retention within the profession
- How the VN Futures initiative might help with the factors associated with retention
- What the new RCVS post-registration qualifications offer in terms of personal professional development

# Nursing and treatment options for the hyperthyroid cat

**Suzanne Rudd**

Hyperthyroidism is a common disorder in middle-aged to senior cats. Increased thyroxine will vastly increase the body's metabolism and affect most major organs in the body. As a consequence of this, hyperthyroidism can cause secondary complications such as cardiac disease, renal disease and hypertension.

Diagnosis of hyperthyroidism is made by measuring thyroxine levels in the blood. Blood should also be taken to look for concurrent illness and provide baseline parameters before starting any treatments.

There are four main treatment options for hyperthyroidism.

- Medical management is the most common treatment used for initial stabilization. Owners will need to medicate their cat once or twice daily either by tablet, liquid medicine or transdermal gel. Some cats will display side effects associated with the drugs. Another treatment option will have to be explored for cats showing side effects. While medical management will reduce T4 levels, the thyroid tumour will not reduce in size and may even continue to grow, meaning that drug dosage may need to be increased over time and the condition can become more difficult to treat
- A prescription diet reduced in iodine is available to treat hyperthyroid cats. The diet is an option for owners who are unable to medicate their cat and where the cat is not a candidate for surgery or radioactive iodine (RAI). To be effective a strict feeding regime has to be followed which can be difficult in cats that go outdoors and eat elsewhere or hunt and also in cats from a multicat household
- Surgical thyroidectomy involves removing either one or both thyroid glands. Risks include damage to, or in some cases, accidental removal of, the parathyroid gland which may result in hypocalcaemia. Calcium levels should be monitored for 3 days postoperatively. Hypocalcaemia will need to be treated with calcium supplementation along with vitamin D. Surgery is not an option if there is ectopic overactive thyroid tissue. This can be confirmed using scintigraphy
- RAI is a safe and effective cure. This treatment can only be given in licensed premises therefore only available in a few specialist centers around the UK. Post injection they are housed in an isolation unit until the radiation has reduced to an acceptable level. Depending on the centre this can be between 1 and 6 weeks. Because of the period of hospitalization, it is important to ensure the cat has no serious underlying diseases. Every cat should be assessed for suitability by undergoing blood/urine

analysis and diagnostic imaging. After RAI some cats may become hypothyroid. In a small number of cases thyroxine supplementation may be required

All treatments mentioned above are suitable to treat thyroid adenoma. However, adenocarcinoma tumours are more difficult to treat. RAI is a treatment option but much higher doses of iodine need to be given, meaning hospitalization in isolation will be much longer.

Handling hyperthyroid cats can be challenging as they generally become stressed very quickly. Minimal handling should be employed with a calm and patient cat-friendly attitude. Procedures such as blood-pressure measurement, blood sampling and ultrasonography may need to be performed in stages. Persisting with a procedure in an already stressed and uncontrolled hyperthyroid cat may cause arrhythmias and heart failure, so great care should be taken. Sedation for procedures such as radiography and ultrasonography is also advised in the stressed hyperthyroid cat. Hyperthyroid cats are at great risk of hypothermia during sedation, so monitoring temperature and minimizing heat loss is advised.

## KEY LEARNING OBJECTIVES

- Free T4 is a more sensitive test than total T4, however free T4 is less specific, therefore total T4 should be measured in the first instance
- Overactive thyroid tissue can sometimes be found in the thorax, therefore scintigraphy is needed to diagnose this
- Radioactive iodine treatment is the gold standard treatment for cats with hyperthyroidism and can be used to treat adenoma and carcinoma tumours

## MULTIPLE CHOICE QUESTIONS

1. Which of the following statements is FALSE?
  - (A) Scintigraphy can be used to diagnose hyperthyroidism
  - (B) Scintigraphy can be used to differentiate between a thyroid adenoma and carcinoma
  - (C) Scintigraphy can be used to locate ectopic thyroid tissue
  - (D) Scintigraphy involves using a radioactive substance
2. Hyperthyroidism in cats is best diagnosed by which diagnostic test?
  - (A) TSH
  - (B) Free T4
  - (C) Total T4
  - (D) T3
3. After a bilateral thyroidectomy calcium levels should be checked how often and for how long after surgery?
  - (A) One to two times daily for 3 days
  - (B) One to two times daily for 7 days
  - (C) Once after 24 hours
  - (D) Three times daily for 3 days

# Ill communication: effective team handovers

**Louise O'Dwyer**

Patient handovers, defined as 'the transfer of information and professional responsibility and accountability between individuals and teams' are high-risk, error-prone patient care episodes. Handover failures are common and can result in diagnostic and therapeutic delays and worsen the incidence of adverse events. The transfer of patients following surgery, to the ICU or recovery team, or between different shift teams, presents particular challenges to healthcare providers on both the delivering and receiving teams. The operating room (OR) anaesthesia and surgical team is charged with transporting the patient, along with clinical and monitoring equipment, from the OR to the receiving unit, while simultaneously monitoring and performing additional therapeutic tasks such as manual ventilation. Upon arrival at the receiving unit, the technology and patient-support responsibilities are transferred to a different team of staff, for whom knowledge of the patient is gained in an environment that is often chaotic and busy, and to a team largely unfamiliar with the patient. This knowledge transfer involves cross-disciplinary staff with varied experience: the delivering team members with their diverse yet important perspectives of the course of surgery and treatment, and the receiving team concurrently stabilizing, assessing, and making care plans for the patient.

It is not surprising, under these circumstances, that patient handovers are rife with technical and communication errors. As recognition of the risks inherent to patient handovers has grown, increasing attention has focused on this process of care.

In 2007, the iSoBAR system was developed, the brief for this handover system was to develop a standardized and transferable clinical handover process and checklist. This system comprises:

- Identify: introduce yourself and your patient
- Situation: why are you calling? Briefly state the problem
- Observations: recent vital signs and clinical assessment

- Background: pertinent information related to the patient
- Agreed plan: what needs to happen? Assessment of the situation
- Read back: clarify and check for shared understanding. Who is responsible for what and by when?

The use of the iSoBAR approach will be discussed further during the lecture, along with surgical safety checklists and significant event reporting.

## KEY LEARNING OBJECTIVES

- Gain an understanding in how communication can fail in busy clinical environments
- Recognize how multiprofessional teams can work together to create seamless communication
- Gain an understanding of, and an ability to use, standardized handover systems and checklists

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is NOT a component of the iSoBAR handover system?
  - (A) Instruction: give roles to specific member of your team
  - (B) Situation: why are you calling? Briefly state the problem
  - (C) Observations: recent vital signs and clinical assessment
  - (D) Background: pertinent information related to the patient
2. Which of the following can create challenges/ failures in terms of patient handovers?
  - (A) Teams unfamiliar with the patient
  - (B) Transfer of patients following surgery, to the ICU or recovery team, or between different shift teams
  - (C) Chaotic and busy environments
  - (D) All of the above
3. Which sport has a team which is viewed as the model example of how a multiprofessional team works together as a single unit?
  - (A) Champions League football
  - (B) Pit-stop in Formula 1 motor racing
  - (C) Ball boys/girls at Wimbledon
  - (D) World Cricket series

## Section IV

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# Veterinary nursing streams

Friday 5 April

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Friday 5 April  
Hall 9

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## (VN) ECC

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- 206 08:15–09:00  
**Nursing the trauma patient**  
Louise O'Dwyer
- 207 09:10–09:55  
**Nutrition myths in critical patients**  
Nicola Ackerman
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**Common toxins in dogs**  
Sarah Egleston
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**Bleeding nightmares**  
Emily Thomas
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**How to manage a chest drain**  
Emily Thomas
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**How to place nasal oxygen catheters**  
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- 211 14:45–15:30  
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Sarah Egleston
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- 213 17:30–18:15  
**Managing the dyspnoeic patient**  
Emily Thomas

# Nursing the trauma patient

**Louise O'Dwyer**

## TRAUMA: INITIAL ASSESSMENT AND STABILIZATION

Trauma is a common cause of emergency presentations in small animal practice. Due to our patients' small size the potential for multisystem damage is high and their injuries need to be approached in a systematic manner to ensure that no life-threatening abnormalities are missed. Appropriate management in the first few hours is vital for success. Many patients benefit from a multi-modal approach in the successive days, concentrating on careful nursing, nutrition and pain relief.

## MANAGEMENT OF MAJOR BODY SYSTEM ABNORMALITIES

### Cardiovascular

Mortality in hypovolaemic shock is related to duration of the ischaemic insult. Early replacement of circulating volume is key to successful patient management. Stabilization of the cardiovascular system is aimed at replacement of lost circulating volume with intravenous fluid therapy. First choice is always isotonic crystalloid fluids, e.g. lactated Ringer's solution. The volume of fluid given is based upon the severity of hypoperfusion. A proportion of 'shock dose' is administered over a short period of time (15–20 minutes) and the patient reassessed.

### Respiratory

In severely dyspnoeic animals, actively taking control of the airway (which often only requires very small doses of sedative in severely dyspnoeic animals) is vastly superior to intubating them following a respiratory arrest.

The first part of the evaluation of the respiratory tract should be to watch and listen without a stethoscope. An enormous amount of information can be gleaned from just observation, before even touching the patient. One should also be aware of the postural manifestations of dyspnoea such as extended neck, abducted elbows, open-mouth breathing, an anxious facial expression, increased abdominal movement and paradoxical abdominal movement.

The differentiation between inspiratory and expiratory dyspnoea can also aid in the localization of the disease process. Inspiratory dyspnoea with stridor or stertor is associated with dynamic upper airway obstruction. In cats, chronic pleural effusions may be associated with inspiratory dyspnoea without stertor. Expiratory dyspnoea is a feature of feline allergic airway disease.

Most other causes of dyspnoea will be associated with mixed respiratory patterns. Short shallow respiration and sometimes panting may be seen in some pneumothoraces.

### Neurological

Neurological assessment should only really be interpreted in patients that are cardiovascularly stable. Any abnormalities found on initial examination should be corroborated later.

Where brain injury is suspected, cranial nerve testing should be carried out to evaluate for increased intracranial pressure. This is usually seen as unilateral changes in pupillary size. Unresponsive pupils that are mid-size occur with brainstem trauma that progresses into the medulla, and are usually a grave sign. There may also be an associated Cushing's response. This response occurs secondary to increased intracranial pressure (ICP) and results in systemic hypertension and associated secondary bradycardia.

The primary aim in patients with brain injury is to restore and maintain tissue perfusion and oxygen therapy. Oxygen should be administered and efforts to restore circulating volume initiated.

## KEY LEARNING OBJECTIVES

- Gain confidence in the assessment of trauma patients
- Recognize major body system abnormalities, to allow prioritization of treatment
- Understand the focus of stabilization of trauma patients in terms of normalization of the respiratory, cardiovascular and neurological systems

## MULTIPLE CHOICE QUESTIONS

1. A cat involved in a road traffic accident presents with pale mucous membranes and a slow capillary refill time. Which of the following heart rates would cause most concern?  
(A) 120 bpm  
(B) 170 bpm  
(C) 180 bpm  
(D) 190 bpm
2. Which of the following is a normal blood lactate measurement?  
(A) <2.5 mmol/l  
(B) 2.5–7.5 mmol/l  
(C) 7.5–10 mmol/l  
(D) 10–15 mmol/l
3. What does hypovolaemic shock refer to?  
(A) Loss of red blood cells  
(B) Tissue dehydration  
(C) Loss of intravascular circulating volume  
(D) Loss of extravascular fluid

# Nutrition myths in critical patients

Nicola Ackerman

Nutrition, in all patients, depends on the disease process and/or the individual's specific requirements. Each case must be considered on its own specific requirements once a full clinical examination (including nutritional assessment) and history has been achieved. The sole aim can be defined as to prevent and/or treat malnutrition. To define any nutritional aims in more depth, it is more beneficial to split the aims in to short-term and long-term goals. The short-term aims are to:

- Provide for any ongoing nutritional requirements (both in terms of energy and nutrients)
  - Prevent or correct any nutritional deficiencies or imbalances
  - Minimize metabolic derangements
  - Prevention of further catabolism of lean body mass
- Long-term nutritional aims should include:
- Restoration of optimal body condition (body condition score (BCS), and muscle condition score (MCS))
  - Provide required nutrients to the animal within its own environment that aid in promoting good health

There are many nutritional myths that are commonly seen in veterinary practice. These range from misinformation in matters concerning certain ingredients commonly found in pet foods, to what foods should be fed and how to calculate energy requirements. It is very common to see energy requirements being met, but specific nutrient requirements are often overlooked.

The role of fats in the diet is often misunderstood. The types of fats and the fat levels are equally important. In gastrointestinal disease, fats play an important role in energy supply, reduction of inflammation, transport of fat-soluble vitamins and in repair of the cell phospholipid layer in cell walls. Foods that are severely restricted in fat levels might not be indicated in many disease processes.

The role of grains in the diet is also often misunderstood. Grains provide an excellent fibre source, of different fibre types (fermentable and non-fermentable). Fibre is important in normalizing gut transit time, providing nutrients to the gut biome and aiding in producing a more acceptable faecal stool.

## KEY LEARNING OBJECTIVES

- To be able to look at the nutrition evidence base in order to make a supported recommendation for the patient and client
- Understand some of the misinformation concerning nutrition and how to discuss this with pet owners
- How to calculate energy requirements based on nutritional assessment and ensure that the nutrient requirement is met

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is one of the calculations that can be used to calculate resting energy requirements (RER)?
  - (A)  $RER = 70 \times (\text{bwt kg})^{0.75}$
  - (B)  $RER = 30 \times (\text{bwt kg})^{0.75}$
  - (C)  $RER = 70 \times (\text{bwt kg})^{0.50}$
  - (D)  $RER = 30 \times (\text{bwt kg})^{0.50}$
2. When is the best time to start a diet transition?
  - (A) As soon as the animal has been diagnosed
  - (B) Once the animal is settled at home
  - (C) In the practice ward
  - (D) Once the animal is better
3. Which of the following is correct about high-fat diets?
  - (A) Take a shorter time to empty from the stomach
  - (B) Take the same time to empty from the stomach
  - (C) Take a longer time to empty from the stomach
  - (D) Cause constipation

# Common toxins in dogs

Sarah Egleston

Toxins are a common complication dealt with in the referral and first-opinion veterinary setting. Dogs can be exposed to a variety of foods, drugs and chemicals which can pose a risk to their health.

Adequate telephone triage is paramount in these patients. Ingestion of some toxins requires immediate intervention and may be immediately life-threatening. At home remedies to induce emesis should be avoided, as these can cause complications which would be better

dealt with in the veterinary environment (e.g. aspiration, choking or a vasovagal response). It is useful to know what toxin the patient has ingested and when. If the owner is aware what toxin their pet has ingested, asking them to bring it with them to the clinic can be useful.

On presentation to the clinic, these patients should have an immediate assessment of the major body system and any life-threatening problem treated first. Decontamination can be performed if indicated. One type of decontamination is emesis; a medication used routinely in hospital to induce emesis in dogs is apomorphine. This is indicated if the toxin has been ingested within the previous 4 hours. The patient will suffer more adverse effects due to the toxin, the longer we wait to induce emesis, so prioritizing these cases is key. Emesis should be avoided if a patient is drowsy or unconscious, seizing, or has a reduced gag reflex.

Chocolate	The toxic ingredient in chocolate is theobromine and varies in concentration depending on the chocolate ingested (e.g. dark chocolate contains more than white chocolate). Signs: agitation, muscle tremors, tachyarrhythmias and hyperexcitability
Raisins and grapes	The toxic quantity ingested of these depends on the dog, and the toxic mechanism is not currently understood. These are nephrotoxic
Non-steroidal anti-inflammatory medication (e.g. ibuprofen)	Used commonly in the home for pain management. Ibuprofen specifically can cause gastrointestinal signs and kidney damage
Xylitol	An artificial sweetener commonly found in chewing gum and peanut butter. Causes liver damage, hypoglycaemia and seizures
Anticoagulant rodenticides	Used to control rodent infestations. Not all rodenticides are anticoagulant, so the ingredients should be checked. Signs include petechiae and haemorrhage

Figure 1: Some common toxins in the dog

Other forms of decontamination are topical, gastric lavage and intralipid infusion.

Contraindications to inducing emesis include any patient with:

- Respiratory distress
- Seizure activity
- Neurological impairments
- Oesophageal disease

Emesis is also contraindicated if the toxin is:

- Caustic or corrosive material
- Acid or alkali material
- Sharp objects, e.g. bone
- Large amounts of cloth or material

Activated charcoal can be administered orally and binds to some toxins left after decontamination. It is known not to effectively absorb certain toxins (e.g. metals, detergents). Charcoal can be given in a small amount of food to promote ingestion, or via a nasogastric feeding tube. Administration via a syringe should be avoided as there is the risk of the patient aspirating it.

The goal of further therapy is to prevent any further toxin absorption and administering of any antidotes needed. Supportive care should also be provided. Organ damage can be caused by some toxins, so further treatments based on clinical signs should be administered. See Figure 1.

KEY LEARNING OBJECTIVES

- To have good understand of the urgency of some ingested toxins
- To understand the need to prioritize these patients
- Know the common toxins in the dog, and how we treat them in a clinical setting

MULTIPLE CHOICE QUESTIONS

1. Which of the following is a sign of xylitol toxicity?  
(A) Hypoglycemia  
(B) Liver damage  
(C) Seizures  
(D) All of the above
2. If emesis is indicated, should it be initiated less than 4 hours post ingestion?  
(A) Yes  
(B) No
3. Should activated charcoal be administered regardless of what type of toxin has been ingested?  
(A) Yes  
(B) No

Bleeding nightmares

Emily Thomas

Bleeding disorders are common in pets and can be life-threatening. Nurses are involved with initial triage and stabilization of bleeding patients, diagnostic testing and facilitating treatment. Coagulation is a rapidly evolving and complex field, but a remarkable amount can be done based on first principles with minimal equipment.

EMERGENCY APPROACH

The first step in any bleeding patient is to assess the major body systems and start emergency stabilization as appropriate. Actively bleeding patients are at risk of hypovolaemic shock and, if present, this should be treated immediately with a bolus of isotonic crystalloid fluids. When possible, haemostasis is achieved by applying pressure using swabs. Tourniquets should be avoided. Patients bleeding into the lungs or pleural space may be dyspnoeic, in which case oxygen should be supplemented as a priority. Haemorrhage into the brain can

cause seizures or altered level of consciousness. These patients should have their front end elevated on a slant board at 15–30 degrees, flow-by oxygen provided, and anything restricting jugular outflow (e.g. collar) removed.

Careful handling is essential for patients with a suspected coagulopathy. Avoid jugular venepuncture, and neck leads (use a harness). Blood samples should be taken at intravenous catheter placement to avoid sticking the patient more than once. Therefore, think ahead and collect extra samples that may be required (e.g. citrate tube for coagulation times, extra EDTA for blood typing).

## TIPS FOR TRICKY HAEMOSTASIS

Epistaxis is treated with ice packs, cage rest and mild sedation (care to avoid hypotension). Packing the nose using tampons soaked in dilute adrenaline (1:100,000) can be helpful but is often poorly tolerated without deep sedation.

Abdominal wraps can be considered for peritoneal haemorrhage, but are controversial. There is increasing interest in the use of tranexamic acid (10 mg/kg slow i.v.) in veterinary medicine. This reduces breakdown of the fibrin clot, and may help mitigate haemorrhage. Autotransfusion carries risks, but may be life-saving as a last resort.

## HOW DOES BLOOD CLOT?

Coagulation is traditionally divided into sequential primary and secondary haemostasis. Primary haemostasis is platelet activation and aggregation to form a 'plug' at the site of injury. Secondary haemostasis is the serial activation of coagulation factors in a cascade-like fashion with ultimate formation of fibrin, which stabilizes the platelet plug. We now know that interactions between platelets and coagulation factors are more complex than this, and as research progresses our clinical approach is likely to change in the future.

## COAGULATION TESTING

Coagulation tests are notoriously unreliable and blood must be collected with minimal trauma (from a peripheral intravenous catheter at placement is fine), and tubes filled to exactly the volume required. Automated platelet counts must be confirmed with blood smear evaluation. Further details with videos and illustrations can be found at <https://ahdc.vet.cornell.edu/Sects/Coag/samplingoverview.cfm> and <http://www.eclinpath.com/hematology/tests/platelet-count/> (accessed September 2018).

Point-of-care analysers are increasingly available for testing secondary haemostasis (prothrombin time (PT),

activated partial thromboplastin time (aPTT)). If in-house analysis is unavailable but immediate results are required, then a local referral hospital may be able to run the tests for you.

## KEY LEARNING OBJECTIVES

- Recognize systemic consequences of severe haemorrhage and describe key nursing interventions for their stabilization
- Outline some basic and advanced techniques for non-surgical haemostasis
- Identify how routinely available coagulation tests relate to different stages of coagulation, and describe appropriate sample collection

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is an appropriate initial nursing intervention for a comatose patient with suspected intracranial haemorrhage?
  - (A) Administer tranexamic acid 10 mg/kg slow i.v.
  - (B) Apply ice packs over the head
  - (C) Elevate the patient's front end on a slant board at 20 degrees
  - (D) Ensure body temperature is maintained (e.g. blanket, hot hands)
2. Which statement is correct about PT (prothrombin time) testing?
  - (A) Anticoagulant rodenticide toxicity causes prolongation of PT
  - (B) It tests for primary haemostasis
  - (C) Samples must be collected from the jugular through a 21-G needle
  - (D) This test can only be run at specialist laboratories
3. A 6-year-old female neutered Cocker Spaniel presents with severe epistaxis. Which of the following statements is true about nasal packing?
  - (A) A tampon soaked in dilute adrenaline can be used
  - (B) It is typically well tolerated but may cause sneezing
  - (C) Packing should not be attempted before diagnostic testing has been performed
  - (D) The patient is anaesthetized and swabs placed via the retropharyngeal space

# How to manage a chest drain

Emily Thomas

The pleural space is a potential space around the lungs which can become filled with fluid, air, soft tissue masses or abdominal contents. Chest drains are placed to remove severe or recurrent accumulations of air or fluid

from this space. Traditionally, trochar chest drains were placed, but less invasive Mila chest drains, placed using a Seldinger (over-the-wire) technique, are now often used ([https://www.youtube.com/watch?v=MqnB\\_Eq6clo](https://www.youtube.com/watch?v=MqnB_Eq6clo)).

## MAINTENANCE AND MONITORING

Chest drains should always be handled in a sterile fashion (i.e. scrub or wash/Sterillium® before sterile gloving). The insertion site is covered with a sterile dressing, and padded for patient comfort. The dressing and padding are secured with stockinette or loose cohesive bandage

around the thorax. Ensure that this is not too tight and does not rub at pressure points (e.g. around forelimbs). The dressing is changed daily and the drain insertion site is inspected for abnormal skin colour, discharge or malodour. The length of drain outside the chest should be checked daily to ensure it is not migrating. Sutures are also checked. An Elizabethan collar is essential to prevent interference with the drain and development of pneumothorax. At least two different closure methods should be in place (e.g. clamp and bung) unless suction is being performed.

Chest drain complications include tension pneumothorax, which can be rapidly life-threatening. Therefore, 24-hour patient monitoring is essential. Respiratory rate and effort should be noted every couple of hours, and a full patient check including bilateral thoracic auscultation with a stethoscope should be performed several times daily. Subcutaneous emphysema may indicate migration of drain holes. New-onset pyrexia should prompt inspection of the drain site for possible infection.

## ANALGESIA

Levels of pain will vary depending whether the patient has undergone thoracic surgery. However, chest drains are uncomfortable even in non-surgical patients. Frequent assessment is recommended using a pain scoring tool (e.g. <https://www.ava.eu.com/wp-content/uploads/2015/11/GlasgowPainScale.pdf>). Multimodal analgesia is useful and may include systemically administered analgesics and local anaesthetics. A maximum total dose of 2 mg/kg (dog) or 1 mg/kg (cat) 0.5% bupivacaine diluted 1:10 with 0.9% NaCl instilled via the chest tube (sterile technique) can provide analgesia for up to 8 hours, although instillation can be painful.

## SUCTIONING

Intermittent suction is performed using sterile technique with a three-way tap and Luer-lock syringe (5–50 ml depending on patient size and volume expected). Take care that the drain is never left open to the environment, which may cause pneumothorax. Document the amount retrieved, appearance of any fluid, and side of thorax (if bilateral drains in place).

Continuous suction is appropriate if large volumes are accumulating rapidly. Commercial single and multi-use

continuous suction units are available. These usually use a three chamber system with a water seal (for an explanation of the mechanism see <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4356865/>). Continuous suction can also be achieved with a one-way valve known as a Heimlich valve. Heimlich valves can be useful in patients with large-volume pneumothorax, but do not allow quantification of air that is drained.

## KEY LEARNING OBJECTIVES

- Describe appropriate monitoring for a patient with a chest drain, including how to change dressings and monitor the drain insertion site
- List options for providing multimodal analgesia for chest drain patients
- Outline how to perform chest drain suction (intermittent or continuous)

## MULTIPLE CHOICE QUESTIONS

1. What is a Heimlich valve used for?
  - (A) Continuous evacuation of pneumothorax via a chest drain
  - (B) Sterile intrapleural administration of drugs
  - (C) Maintenance of a patent water seal in three-chamber commercial suction systems
  - (D) Wire introduction during Seldinger technique chest tube placement
2. Which drug is often administered intrapleurally?
  - (A) Bupivacaine
  - (B) Buprenorphine
  - (C) Carprofen
  - (D) Ketamine
3. During a routine check of a chest drain patient you notice subcutaneous emphysema along the patient's flank. What is the most appropriate next step?
  - (A) Apply loose cohesive bandage around the area
  - (B) Check drain for migration
  - (C) Suction the chest drain
  - (D) Take the patient's temperature

# How to place nasal oxygen catheters

**Sarah Egleston**

In patients with respiratory problems, oxygen should be administered. On presentation of the patient for the initial stabilization and assessment, short-term oxygen therapy can be given via mask or flow-by. Ongoing long-term oxygen therapy can be administered via a commercial oxygen cage, nasal prongs, nasal cannula or mechanical ventilation. Usually, nasal prongs are the first

choice for long-term oxygen therapy, but these can easily become dislodged and are then unreliable for oxygen delivery. A nasal cannula can be placed, unilaterally or bilaterally. Oxygen can then be delivered directly into the respiratory tract via a silicone feeding tube attached to an oxygen source. It is necessary to humidify long-term oxygen therapy, to prevent desiccation and irritation of the respiratory mucous membranes.

A unilateral nasal cannula can deliver an oxygen percentage of 40–50%, and bilateral can deliver a percentage of 60–70%. The suggested oxygen flow rate for nasal cannulae is 50–100 ml/kg/min.

Mild sedation (butorphanol 0.1–0.2 mg/kg) can be given before placement, to settle the patient and make them more amenable.

Equipment needed includes:

- 0.5% proxymetacaine
- Skin suture
- Silicon feeding tube
- Sterile lubricating jelly
- Adhesive tape
- Gloves

Method:

1. Measure the silicone feeding tube from the nostril to the medial lateral canthus and mark the point on the tube
2. Five minutes prior to placement, insert a few drops of the 0.5% proxymetacaine down the desired nostril, and in the eye of the same side. This acts as a local anaesthetic and helps prevent the patient being irritated
3. The patient's head should be positioned dorsally and wearing gloves the lubricated tube is placed into the ventral meatus, aiming for the base of the opposite ear
4. The tube should then be advanced gently, until it is up to the marked spot
5. Butterfly winged tape is attached to the tube near the nostril, where it should be sutured in place
6. The catheter should then be looped dorsally between the eyes and sutured in place through butterfly winged tape
7. The process should then be repeated in the other nostril if desired

In an emergency, nasal cannulae can be secured with staples, but these should be replaced with a suture when the animal is stable, as staples can cause more pain and trauma to the skin.

Complications can include:

- Excessive sneezing
- Dyspnoea if upper airway disease is present (e.g. brachycephalic breeds)

- Epistaxis
- Nasal cannulae should be avoided in the head trauma patient, to avoid sneezing, as this raises intracranial pressure
- Animals that are panting or open-mouth breathing are poor candidates, as the air mixes in the pharynx and reduces the efficiency of the cannula

Cannulae can stay in place for a prolonged period while the patient recovers from his/her respiratory injury, disease or infection. An Elizabethan collar can be used to ensure the patient doesn't remove the cannula.

## KEY LEARNING OBJECTIVES

- Understand what equipment is needed for placement of nasal cannula
- Learn how to place a nasal cannula
- Understand what patients would benefit from placement, and complications that can be encountered

## MULTIPLE CHOICE QUESTIONS

1. What is the suggested flow rate of oxygen for patients with nasal cannulae in place?
  - (A) 200 ml/kg/h
  - (B) 50–100 ml/kg/h
  - (C) 50–100 ml/kg/min
  - (D) 2 ml/kg/h
2. What oxygen percentage can bilateral nasal cannulae deliver?
  - (A) 30–40%
  - (B) 50–60%
  - (C) 60–70%
  - (D) 70–80%
3. Can long-term oxygen therapy be delivered via non-humidified flow-by oxygen?
  - (A) Yes
  - (B) No

# Nursing the septic abdomen patient

**Sarah Egleston**

Septic abdomen is an inflammatory condition of the abdomen secondary to bacterial infection. Systemic inflammatory response syndrome (SIRS) happens in response to that infection. Some common causes of septic peritonitis in our veterinary patients are surgical contamination, abscesses, neoplasia and penetrating foreign bodies. Septic patients have a high rate of mortality. Management of these patients can present a challenge to the nursing team as they require constant monitoring and often one-on-one 24-hour nursing care.

## PATIENT ASSESSMENT

The level of observation pre- and postoperatively depends on numerous factors (maintaining homeostasis,

managing pain and perfusion). Patients that are less stable require more intensive monitoring (i.e. every 15 minutes), and the more stable patient may require assessment every 1–2 hours. It can be difficult to ensure all the patient's needs are assessed, so it is important to take into account multiple critical parameters.

- Cardiovascular system: heart rate can be monitored via thoracic auscultation, pulse rate and electrocardiogram (ECG). Mucous membranes and capillary refill time can indicate issues if abnormal, and blood pressure should be assessed
- Respiratory system: respiration rate, effort and pattern should be assessed before handling the patient. Lung sounds should be auscultated. Oxygen can be administered in a patient with impaired respiration
- Neurological status: this should be assessed every time we interact with the patient, and we can use the modified Glasgow Coma Scale to assess trends in neurological status
- Fluid balance: monitoring ins and outs is key in these patients to ensure adequate volume status.



Dehydration should be corrected in 12–24 hours. Maintenance crystalloids can be used to maintain fluid balance. Synthetic colloids should be avoided as these are associated with the risk of acute kidney injury and impaired coagulation in our septic patients. To ensure the patient doesn't become under- or overhydrated, fluid balance should be re-evaluated frequently

- Glucose and electrolytes: glucose is commonly altered in septic patients. We can administer a constant rate infusion (CRI) of glucose, or an insulin CRI if the patient is hyperglycaemic. Glucose should be monitored regularly to ensure euglycaemia. Electrolytes should also be checked regularly and any deficits corrected with appropriate fluid therapy and supplementation as needed
- Coagulation: these patients are at risk of developing disseminated intravascular coagulation (DIC). Platelet count and clotting times should be monitored
- Nutrition and proteins: where possible, enteral nutrition is preferred over parenteral nutrition. Enteral nutrition should be avoided if the patient is neurologically inappropriate, has a reduced gag or is regurgitating/vomiting. Early enteral nutrition (<24 hours postoperatively) has been associated with a better prognosis. A nasogastric feeding tube can be placed to facilitate this

We should be providing a gold-standard level of care to our patients and flagging up any concerns with the case veterinary surgeon when necessary.

## KEY LEARNING OBJECTIVES

- Challenges with the septic abdomen patient
- Gain improved knowledge on how to carry out an assessment in these septic abdomen patients
- Understand what clinical parameters we should be worried about in these patients

## MULTIPLE CHOICE QUESTIONS

1. Is enteral feeding preferred in the septic patient over parenteral feeding?  
(A) Yes  
(B) No
2. What fluid therapy should be avoided in the septic abdomen patient?  
(A) Compound sodium lactate  
(B) Synthetic colloids  
(C) Sodium chloride 0.9%  
(D) Fresh frozen plasma
3. Within how long should dehydration be corrected?  
(A) 0–12 hours  
(B) 12–24 hours  
(C) 24–36 hours  
(D) 36–48 hours

## Dying to pee: Nursing the blocked cat

**Suzanne Rudd**

A cat with a urethral obstruction will usually present with a large, firm, painful bladder. The nurse should triage the cat on arrival, paying particular attention to the bladder and the cardiovascular system, as hyperkalaemia is one of the most severe complications seen with urethral obstruction causing bradydysrhythmias, atrioventricular block and/or atrial standstill. An electrocardiograph (ECG) should be used for assessment and monitoring. Blood should be taken to measure electrolytes and renal values as a minimum.

Intravenous fluid therapy should be given. It is essential that cats with blood results showing metabolic or cardiac abnormalities should be stabilized first before sedation or anesthesia (a protocol can be found in the BSAVA Manual of Feline Practice).

If the bladder is so large and the cat is unfit to be anaesthetized, then the veterinary surgeon can consider careful decompressive cystocentesis or, in a collapsed cat, gentle conscious catheterization.

Once stabilized, the cat can be anaesthetized. Opioid analgesia is essential during the unblocking procedure and postoperatively. Relieving the obstruction should be tried by catheterization and retrograde hydropulsion.

Plain radiography as well as intrarectal palpation may help locate the blockage. If the obstruction cannot be felt then catheterization and flushing with saline should be tried initially.

Once the blockage is relieved the urinary catheter can be passed and all of the urine removed. Samples can then be taken and diagnostic imaging performed to determine the cause of the obstruction. The bladder should then be lavaged, drained and the catheter removed. A catheter may need to be left in situ if the cat has had repeated obstructions that are difficult to relieve, severe inflammation and swelling of the penis and prepuce, or if there are persistent metabolic abnormalities where urine output needs to be monitored. If the catheter is to be left in place a soft catheter should be used and sutured in place. Catheters are generally left in for 1–4 days to allow the urethra to relax and while any acute kidney injury (AKI) is resolving. If there is concern over detrusor muscle function the catheter can be left in for up to 5–7 days.

Postanaesthesia intravenous fluids should be slowly titrated down accordingly monitoring for hyper- and hypokalaemia. Unless contraindicated (e.g. AKI), urethral relaxants can be given while the catheter is in place and for a week post catheter removal. Prazocin, a smooth muscle relaxant, and dantrolene, a skeletal muscle relaxant, can be used to provide comfort while the catheter is in place and after removal to prevent urethral spasm and possible re-obstruction due to this.

If the cat is unable to have the obstruction relieved then it will have to undergo surgery for either a urethrostomy, tube cystostomy or pigtail catheter.



Long-term care will often involve looking at the cat's lifestyle, weight, behaviour and diet. Owners will need a lot of support and guidance and the veterinary nurse can help to provide this.

## KEY LEARNING OBJECTIVES

- It is essential that a cat with a urethral blockage is assessed for azotaemia, hyperkalaemia and with an electrocardiograph (ECG) before sedation or general anesthesia is considered
- Where fluid therapy alone cannot correct hyperkalaemia, other interventions may need to be considered
- Understanding when the urinary catheter should be removed

## MULTIPLE CHOICE QUESTIONS

1. An ECG of a cat with hyperkalaemia may show which of the following characteristics?
  - (A) Wide T waves, large P wave and large QRS complex

- (B) Wide T waves, small P waves and a small QRS complex
  - (C) Tall spikey T waves, large P wave and a short QRS complex
  - (D) Tall spikey T waves, loss of P wave and a prolonged QRS complex
2. Which of the following statements is FALSE?
  - (A) A Jackson cat catheter had side holes so not ideal for unblocking cats with a urinary obstruction
  - (B) A Jackson cat catheter is ideal for long-term use
  - (C) A Jackson cat catheter is more likely to cause inflammation to the urethra than the other urinary cat catheters
  - (D) All of the above
3. What is prazocin?
  - (A) Smooth muscle relaxant
  - (B) Skeletal muscle relaxant
  - (C) Diuretic
  - (D) Anxiolytic

# Managing the dyspnoeic patient

Emily Thomas

Severe dyspnoea is life-threatening. Respiratory dysfunction causes blood oxygen content to fall, with respiratory rate and effort increasing to compensate. However, compensation increases the oxygen demand of respiratory muscles. Severely dyspnoeic patients may, therefore, need all their physiological reserves simply to maintain breathing. Rapid stabilization and minimal stress are essential to prevent further decompensation.

## OBSERVATION OF THE PATIENT

Airway patency, respiratory rate, breathing pattern and degree of respiratory effort can all be rapidly ascertained at triage without even touching a dyspnoeic patient. Brief thoracic auscultation can usually be performed without causing stress. These simple, non-invasive observations allow presumptive localization of the anatomical source

of respiratory distress (Figure 1). This helps to determine appropriate stabilization measures whilst avoiding invasive testing that may cause decompensation.

## OXYGEN SUPPLEMENTATION

Immediate stabilization consists of oxygen supplementation. Flow-by oxygen is simple and quick. It is provided via an oxygen port and tubing or anaesthetic machine and circuit. A flow rate of 2–5 l/min with tubing held around 2 cm from the patient's nose gives an inspired fraction of oxygen (FiO<sub>2</sub>) of 30–50%. Change the position of the flow if the patient is distressed, and in panting animals hold the tubing to the mouth not the nose. A tight face mask provides FiO<sub>2</sub> up to 70% but is stressful in conscious patients.

Short nasal prongs designed for people can be used in dogs. These connect to oxygen tubing (Christmas tree connector). A flow rate of 50–100 ml/kg/min provides FiO<sub>2</sub> of around 40–50%. Prongs are secured using a bridge of tape across the top of the nose. Nasal cannulae are longer, extending to the medial canthus of the eye, and are sutured in place (see [http://www.delawarevalley-academyvm.org/pdfs/oct11/6\\_Nasal\\_oxygen.pdf](http://www.delawarevalley-academyvm.org/pdfs/oct11/6_Nasal_oxygen.pdf)).

Observation	Upper airways	Lower airways	Pulmonary parenchyma	Pleural space
Respiratory pattern	Inspiratory effort	Expiratory effort	Variable	Shallow breathing
Auscultation	Stertor/stridor (heard without a stethoscope)	Wheezes	Harsh sounds or crackles	Quiet lung and heart sounds

**Figure 1:** Localization of the anatomical source of respiratory distress

An oxygen hood is made by placing cling film over an Elizabethan collar, leaving a gap at the top to allow CO<sub>2</sub> to vent, and prevent build-up of temperature/humidity. Oxygen tubing is inserted via the collar at the patient's neck, and taped to the inside of the collar. A flow rate of 1 l/min provides FiO<sub>2</sub> around 40%. Oxygen chambers are less stressful for the patient, but temperature and humidity can increase rapidly and must be carefully monitored.

## FURTHER STABILIZATION

If possible, an intravenous catheter should be placed in case emergency drugs are needed. Severely dyspnoeic patients may benefit from a period of oxygen administration before this is attempted. It is useful to plan ahead and start setting up for any further stabilization procedures, such as thoracocentesis (pleural space disease) or intubation (upper airway obstruction). An equipment tray can be kept near the patient for rapid access if needed.

People describe dyspnoea as 'terrifying' and 'suffocating'. The importance of gentle nursing care cannot be overstated. Careful handling, monitoring and, potentially, sedation may all be of benefit.

## KEY LEARNING OBJECTIVES

- Describe how to localize the source of respiratory distress based on triage examination
- Outline key techniques for providing oxygen to dyspnoeic patients
- List further stabilization measures for dyspnoeic patients and outline their preparation

## MULTIPLE CHOICE QUESTIONS

1. What does auscultation of a patient with pulmonary parenchymal disease typically reveal?  
(A) Crackles  
(B) Quiet lung sounds  
(C) Stertor  
(D) Wheezes
2. A cat in severe respiratory distress becomes cyanotic as you attempt to place a cephalic intravenous catheter. What is the most appropriate course of action?  
(A) Apply EMLA cream to the skin and use a smaller gauge catheter  
(B) Attempt placement in the lateral saphenous vein to minimize stress caused by restraint  
(C) Cover the cat's eyes with a towel to reduce stress  
(D) Place the cat in an oxygen cage and allow it to rest
3. What is an appropriate initial oxygen flow rate when using nasal cannulae?  
(A) 10–50 ml/kg/min  
(B) 50–100 ml/kg/min  
(C) 500–1000 ml/kg/min  
(D) 5000–10000 ml/kg/min

Friday 5 April  
Hall 10

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## (VN) Surgical

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## Caesareans

Paul Aldridge

Dystocia, the difficulty in passing the foetus through the pelvic canal, is a common small animal emergency. Clinical outcomes can be maximized when the clinical team has a thorough knowledge and understanding of normal canine parturition, the aetiology of dystocia, the criteria for diagnosing dystocia, and the appropriate medical and surgical interventions.

### NORMAL PARTURITION

Gestation in the bitch is 63 days; this represents the time elapsed between ovulation and parturition. 'Observed gestation' in the bitch is approximately 57–72 days when established using breeding dates; this represents the time elapsed between observed mating and parturition.

A decline in rectal temperature to below 37.6°C (99.7°F) has been cited as the most consistent change indicating that parturition will take place within the next 12–24 hours. This drop coincides with a decrease in the plasma progesterone level. Parturition is described as occurring in three distinct phases.

### CAUSES OF DYSTOCIA

Dystocia is described as being maternal or foetal in origin. Maternal dystocia is encountered more frequently (60–70% of cases). The most common cause of maternal dystocia is uterine inertia, representing 40–72% of all dystocias attributed to the dam. Uterine inertia is the failure to expel the foetus from the uterus when no obstruction exists; it can be classified as primary or secondary. Foetal dystocia occurs due to relative oversize of the puppy, malpresentation, foetal death or foetal deformity.

### MEDICAL MANAGEMENT OF DYSTOCIA

Once maternal and foetal obstruction have been ruled out, medical management of dystocia can be initiated if appropriate. Blood calcium and glucose levels should be tested, and supplementation given where appropriate. The use of oxytocin to stimulate uterine contraction is widespread.

### CRITERIA FOR CAESAREAN SECTION

- Complete primary uterine inertia
- Partial primary uterine inertia unresponsive to medical management
- Secondary uterine inertia
- Obstructive abnormality of the pelvic canal
- Foetal malposition that cannot be corrected
- Foetal death

- Relative or absolute foetal oversize
- Foetal distress: consistent foetal heart rates <150 bpm or foetal bowel movements can be seen on ultrasonography

### CAESAREAN SECTION

Once the decision has been made to proceed to Caesarean, thorough organization and preparation of the clinical team, the operating theatre and necessary equipment are required. Consideration should be given to the dam's current condition, and her altered physiology when planning induction and maintenance of general anaesthesia. The surgery itself will be classed as 'clean-contaminated', and efforts must be made to minimize the risk of postoperative infection and complications.

Resuscitating the puppies will require designated personnel. Attention should be given to clearing the airway, providing oxygen and gentle resuscitation efforts.

### KEY LEARNING OBJECTIVES

- Learn about the normal gestation and parturition of the bitch
- Learn about the possible causes of dystocia and their clinical signs
- Appreciate the difference in physiology of the pregnant dam, and how anaesthesia and surgery techniques must be adapted

### MULTIPLE CHOICE QUESTIONS

1. What is gestation defined as?
  - (A) Time from observed mating to birth
  - (B) Time from fertilization to birth
  - (C) Time from ovulation to birth
  - (D) Time from mating to first stage of labour
2. What effect do high doses of oxytocin have on the uterus?
  - (A) Severe uncoordinated contractions with foetal distress
  - (B) A reduction in uterine contractions
  - (C) An increase in smooth, productive contractions
  - (D) Induces complete uterine inertia and contractions stop
3. During pregnancy, what is expected with regard to the bitch's packed cell volume?
  - (A) Reduces while the blood volume increases
  - (B) Reduces while the blood volume remains the same
  - (C) Increases while the blood volume stays the same
  - (D) Remains stable while the blood volume increases

# The veterinary nurse's role during acute surgical haemorrhage

**Claire Roberts**

Acute blood loss resulting from surgical haemorrhage can result in haemorrhagic hypovolaemic shock. It is often the veterinary nurse who will alert the veterinary team to cardiovascular changes, provide additional equipment to the surgical team to help achieve haemostasis, calculate the percentage of blood loss and facilitate the administration of replacement fluids.

## PHYSIOLOGICAL CHANGES ASSOCIATED WITH ACUTE SURGICAL HAEMORRHAGE

In acute blood loss, fluid is lost directly from the intravascular space. Intravascular fluid makes up a small proportion of overall body water (1/15th of total body water). Any loss can have a profound effect with patients showing a varying degree of clinical signs depending on the severity:

- Tachycardia
- Reduction in pulse quality
- Absent peripheral pulses
- Prolonged capillary refill time (CRT)
- Changes in mucous membrane colour
- Reduction in urine output
- Obtundation (altered level of consciousness)

If a patient experiences blood loss of more than 10% of their blood volume, this will result in hypoperfusion. See Figure 1.

## METHODS OF HAEMOSTASIS

There is a range of options available to deal with haemostasis. The method used will depend on the size of the blood vessel and the amount of blood loss. It is the responsibility of the veterinary nurse to ensure that there are sufficient supplies available and ready to use. Methods of haemostasis include:

- Digital pressure
- Haemostats
- Surgical swab packing
- Ligatures
- Haemostatic agents
- Tourniquets
- Diathermy

## METHODS FOR CALCULATING SURGICAL BLOOD LOSS

The veterinary nurse should be able to calculate losses accurately, because an underestimation may lead to significant complications and an overestimation may result in unnecessary transfusion.

The most common technique of calculating blood loss is using visual estimation, calculating the number of swabs saturated with blood and measuring the volume of blood in the suction bottle (remembering to subtract any lavage fluids used).

Normal blood volume	
Dog	80–90 ml/kg
Cat	60–70 ml/kg
Normal plasma volume	
Dog	36–57 ml/kg
Cat	35–53 ml/kg

**Figure 1:** Normal blood volumes

## OPTIONS FOR REPLACING FLUID

Volume resuscitation in the hypovolaemic patient should aim to achieve a mean arterial pressure (MAP) of 70 mmHg, but not above, as this will improve perfusion but minimize the risk of dislodging any clots that have formed. There is much debate about which is the best choice for fluid replacement although availability will have an impact on choice. Ideally if the patient has lost >20% of their total blood volume (>10% for debilitated animals), blood loss should be replaced with blood products such as whole blood or packed red blood cells. If crystalloids, such as Hartmann's, are administered to treat blood loss, they should be administered at three times the volume lost; a colloid should be given at equal volume to that lost.

Where rapid fluid resuscitation is required, or where huge volumes of crystalloids would put the patient at risk of overinfusion or haemodilution (decrease in the proportion of red blood cells relative to plasma), hypertonic saline (7.5%) may be more appropriate.

## KEY LEARNING OBJECTIVES

- How to recognize acute blood loss in your surgical patient and the types of haemostasis available to the surgical team
- How to calculate your patient's blood volume and volume of blood loss
- Options for fluid replacement

## MULTIPLE CHOICE QUESTIONS

1. What physiological changes might a patient experience with acute blood loss?
  - (A) Tachycardia
  - (B) Reduction in pulse quality
  - (C) Absent peripheral pulses
  - (D) All of the above
2. How do you calculate normal blood volume in a cat?
  - (A) 80–90 ml/kg
  - (B) 35–53 ml/kg
  - (C) 60–70 ml/kg
  - (D) 36–57 ml/kg
3. During volume resuscitation, what mean arterial blood pressure should be maintained to improve perfusion but minimize the risk of dislodging any clots that have formed?
  - (A) 60 mmHg
  - (B) 90 mmHg
  - (C) 70 mmHg
  - (D) 120 mmHg

# Does what we wear in the theatre impact on patient safety?

**Claire Roberts**

Surgical attire has remained relatively unchanged over the past 50 years; frustratingly there is limited evidence to support what is the best surgical attire in the operating room in relation to infection prevention. Most surgical site infections (SSIs) are caused by the patient's own flora, but operating-room personnel are also a source of bacterial contamination; the aim of surgical attire is to provide a functional barrier between the surgical team and the patient.

## SCRUBS

Scrubs have been standard operating attire since the 1950s. There have been several studies evaluating the effects of scrub material and design, but limited clinical trials looking at their effect on SSI rates. There is evidence to support that a cotton–polyester blend drastically reduced airborne colony forming units (CFU) compared to normal cotton clothing and that wearing scrubs with cuffs at the wrists and ankles, whilst tucking scrubs in, also reduced airborne CFUs.

## MASKS

Surgical masks were first developed in the early 20th century. There is evidence showing that wearing face masks has no effect on overall bacterial counts in the operating room. A study showed no correlation between SSI and the surgical team being masked or unmasked; however, they are worn as part of personal protective equipment for the scrubbed team.

## HATS

Hair, ears and scalps are a potential source of contamination in the operating room. There is a variety of head coverings available, including skull caps, bouffant and hoods. There is however no clear consensus in the guidance relating to the use of headwear within the surgical setting.

Recent literature reviews reveal there is no conclusive evidence that covering the hair prevents SSIs, but does support that there is a serious risk to patients if they are exposed to the skin and hair of individuals working in the perioperative setting.

## GOWNS

Gustav Neuber first started wearing surgical gowns in 1883 and soon after, reported a decrease in SSI. Gowns can be disposable or reusable. Permeable cotton gowns

and drapes increase the risk of SSI compared with impervious gowns.

## GLOVES

William Halsted was the first to develop rubber gloves for the operating team, in 1894, and this resulted in a significant reduction in SSIs, and later a dramatic reduction in SSIs when sterile gloves were used. Whilst double gloving is often used by orthopaedic surgeons, this serves to provide better self-protection to the surgeon but there isn't enough supporting evidence that it reduces SSIs.

## FOOTWEAR

A study looking at theatre shoes and their link in the common pathway of postoperative wound infection showed that theatre shoes and floors present a potential source for postoperative infection. A combination of dedicated theatre shoe and a good floor-washing protocol controls the level of shoe contamination and has a positive impact on SSIs.

## KEY LEARNING OBJECTIVES

- What a surgical site infection is and the impact that surgical attire has in helping to combat them
- The challenges in implementing a protocol regarding what surgical attire is best at helping to reduce surgical site infections
- The arguments that certain surgical attire is still recommended despite lacking supporting evidence that it reduces surgical site infections

## MULTIPLE CHOICE QUESTIONS

1. What causes most surgical site infections?
  - (A) The surgical team's hands
  - (B) The patient's own flora
  - (C) The surgical environment
  - (D) The recovery area
2. What has an impact in reducing colony forming units in relation to theatre scrubs?
  - (A) A cotton–polyester blend
  - (B) Wearing scrubs with cuffs at the wrists and ankles
  - (C) Tucking scrubs in
  - (D) All the above
3. Whilst there is no conclusive evidence that covering the hair prevents SSI, why is it recommended to still wear them?
  - (A) There is a serious risk to patients if they are exposed to the skin and hair of individuals working in the perioperative setting
  - (B) Headwear protects the wearer from sources of infection
  - (C) Headwear reduces the chances of the wearer becoming a vector of infection
  - (D) All of the above

# Thoracic wall trauma

**Paul Aldridge**

Trauma to the thoracic wall can occur through a variety of both sharp (penetrating) and blunt insults. These traumas have the potential to damage the structure and integrity of the wall, with potentially fatal effects on the respiratory system contained within the confines of the thorax. To maintain effective ventilation, the pleural space needs to maintain its integrity, a negative intrathoracic pressure needs to be present, the thoracic wall must be stable, but with the ability to expand and contract with the pull of muscles and expansion of the lungs.

## INITIAL PRESENTATION

All trauma presentations should immediately be brought through to a treatment area on arrival and an initial assessment performed. The initial examination is targeted towards identifying any compromise of the major body systems: airway/breathing, circulation, and the central nervous system. If any deficiency is identified, stabilization measures are immediately taken.

## DIAGNOSTIC IMAGING

Point of care ultrasound (POCUS) is increasingly used to assess trauma to both the abdomen and thorax; ultrasonography can be useful in the assessment of pleural space disease and for some lung parenchyma disease. Radiography is commonly used to assess the thoracic wall itself, identifying rib disruptions. Computed tomography (CT) scanners are becoming more common within veterinary practices, and may be of use in determining thoracic wall and intrathoracic pathology.

## BLUNT TRAUMA

Blunt trauma may result from road traffic accidents, falls or kicks. The insult may cause rib fractures and 'flail chest' segments. Respiratory compromise will be worsened by the pain associated with the injury. Analgesia, occasionally dressings, and rarely surgery may be indicated.

## PENETRATING TRAUMA

Penetrating trauma that breaches the thoracic wall may be caused by insults such as bite wounds, air gun pellets or impalement on objects. Priority is given initially to trying to stabilize any dyspnoeic patients. Penetrating wounds overlying the thorax will need to be surgically explored, to debride the wound and perform routine wound management, but also to assess if the thoracic wall has been penetrated, and, if so, assess the thoracic viscera.

## KEY LEARNING OBJECTIVES

- Appreciate the importance of triage and stabilization in the trauma patient
- Learn the consequences of blunt trauma on the thorax
- Learn about the postoperative nursing of penetrating trauma patients

## MULTIPLE CHOICE QUESTIONS

1. At which rib space is thoracocentesis routinely performed?
  - (A) Second or third
  - (B) Fourth or fifth
  - (C) Seventh or eighth
  - (D) Tenth or eleventh
2. Administering supplemental oxygen via a 'flow-by' technique is likely to achieve which concentration of oxygen in the inspired air?
  - (A) 10%
  - (B) 21%
  - (C) 30%
  - (D) 70%
3. Which muscle overlying the thoracic wall is commonly used as a flap to cover thoracic wall deficits?
  - (A) Pectoral
  - (B) Lattissimus dorsi
  - (C) Scalenus
  - (D) Intercostal

# Preoperative surgical site infection prevention

**Claire Roberts**

All surgical wounds are contaminated with bacteria, it is only when that level of contamination becomes critical, that an infection will occur. Surgical wounds can be contaminated with bacteria from:

- Patient's own flora (endogenous bacteria):
  - Skin
  - Mucous membranes
- Flora from the environment (exogenous bacteria):
  - Air
  - Theatre
  - Personnel
  - Surgical equipment

There are several factors that will affect surgical wound infection, including host factors, surgical wound factors and pathogen factors.

# (VN) Surgical

Hand hygiene	Good hand hygiene is one of the most important aspects of infection control. Correct hand-washing protocols should be visible with the provision of appropriate decontamination solutions
Patient preparation	Vital in ensuring best patient outcome, is designed to reduce microorganisms at the skin surface, reduce pathogenic bacteria prior to surgery and reduce the risk of wound infection post surgery. Hair removal should take care not to damage the skin and should be performed immediately before surgery A surgical skin preparation should be performed with appropriate skin solutions at the correct dilution, allowing the correct contact time
Personnel dress and theatre conduct	The theatre team should wear designated theatre attire which is laundered to hospital standards Unnecessary theatre movement should be avoided as this increases number of particles in the air which may increase the incidence of SSIs
Control of infection in the theatre suite	Written protocols should be taught, followed and upheld. Clutter should be kept to a minimum and a hospital-grade disinfectant should be used at the correct dilution rates Surgical procedures should be classified as clean, clean-contaminated, contaminated and dirty. Clean procedures should ideally be performed at the beginning of the day
Equipment cleaning and sterilisation	Instruments should be cleaned, packaged, sterilized and stored correctly
Antibiotic use	A hospital perioperative antibiotic protocol should be designed, implemented and adhered to, as over-reliance of antibiotic use does not make up for poor theatre practice and is associated with increased risk of SSIs
Anaesthesia and surgical times	Infection rates increase by 30% for every additional hour of surgery and anaesthesia Patients ASA $\geq 3$ increases risk of SSIs Hypothermic patients are at increased risk of SSIs

Figure 1: Specific areas to consider in the pre-operative phase

## PREVENTION OF SURGICAL SITE INFECTIONS

For prevention of surgical site infections (SSIs), excellent surgery alone is not sufficient. It needs to be a team approach and the practice should have rigid protocols in place. In a busy hospital setting it can be extremely useful to have a lead member of the team to focus on infection control surveillance. Hand hygiene is always high up on the list of infection prevention.

Whilst total eradication of SSIs is unrealistic, our aim should be to reduce the occurrence through hospital and patient management. This can be achieved in part through thorough patient assessment, which enables the anaesthetic and procedure times to be minimized and enables the surgical team to schedule clean procedures at the beginning of the day.

The veterinary team are must understand and perform strict aseptic technique in a variety of areas (Figure 1).

## KEY LEARNING OBJECTIVES

- How surgical wounds can be contaminated in the hospital
- The impact that poor theatre management can have on surgical site infections (SSIs)
- Factors to consider in the preoperative phase that can help in the reduction of SSIs

## MULTIPLE CHOICE QUESTIONS

1. Which of the following will not reduce the risk of SSIs?  
(A) Hand hygiene  
(B) Clipping prior to induction of anaesthesia  
(C) Preoperative patient warming  
(D) Correct wound classification
2. In relation to SSIs, what relevance does anaesthesia have?  
(A) There is no correlation between the length of anaesthesia and SSIs  
(B) For every hour a patient is anaesthetized, the risk of a SSI decreases by 30%  
(C) Infection rates increase by 30% for every additional hour of anaesthesia  
(D) Anaesthetic-related hypothermia decreases the risk of SSIs
3. Which of the following areas will contribute to reducing preoperative surgical site infections?  
(A) Hand hygiene  
(B) Reduction in theatre traffic  
(C) Correct contact time for skin preparations  
(D) All of the above



# How to reduce postoperative hospital-acquired infections

**Claire Roberts**

In 2016, the World Health Organization (WHO) published 'Global Guidelines for the Prevention of Surgical Site Infection'. The guidelines include a list of 29 concrete recommendations with 16 of them focusing on during and post-surgical prevention. Surgical site infections are the third most common type of hospital-acquired infections (HAI) in human medicine.

An HAI is classified as an infection that occurs:

- Up to 48 hours after hospital admission
- Up to 3 days after discharge
- Up to 30 days after an operation
- In a healthcare setting when the patient was admitted for reasons other than an infection

## CAUSES OF HOSPITAL-ACQUIRED INFECTIONS

Bacteria, fungi and viruses can cause HAIs. In human medicine, bacteria alone cause about 90% of cases. Patients who are immunocompromised are at increased risk of contracting an infection during hospitalization. These microorganisms spread mainly through person-to-patient contact from unclean hands, medical and hospital equipment. HAIs also increase with excessive or incorrect selection of antibiotics, which can lead to emergence of antibiotic resistance bacteria.

The most common types of HAIs are:

- Surgical site infections
- Intravenous catheter- and arterial line-associated infections
- Catheter-associated urinary tract infections
- Pneumonia

## CLINICAL SIGNS

Clinical signs of HAIs will vary depending on the source of the infection, but may include:

- Inflammation, swelling, discharge from the wound/catheter site
- Tachycardia
- Tachypnoea
- Fever or hypothermia
- Dysuria/haematuria
- Dyspnoea
- Nausea, vomiting, diarrhoea

## WHO IS AT RISK FOR HOSPITAL-ACQUIRED INFECTIONS?

Any patient admitted to the veterinary hospital is at risk for contracting an HAI. The following can affect the risk:

- Patients are incorrectly hospitalized (infectious cases not barrier nurses/isolated)

- Age (neonates and older patients at increased risk)
- Extended antibiotic use
- Presence of indwelling devices (urinary catheters, intravenous catheters, chest drains etc.)
- Prolonged stay in hospital
- Following trauma and/or shock
- Immunosuppression
- Surgical implants
- Long surgical procedures and anaesthesia
- Hypothermia

## PREVENTING HOSPITAL-ACQUIRED INFECTIONS

A 70% decrease in HAI can be seen when a team takes steps in prevention. Whilst antibiotics are indicated for some surgical procedures and individual patients, they are not indicated in all surgical patients and can add unnecessary cost, lead to adverse drug reactions, and encourage the selection of resistant bacteria.

It is recommended that all surgical wounds are covered with a dressing to provide a physical barrier to protect the wound from contamination from the external environment until the wound becomes impermeable to microorganisms. Human postoperative care bundles recommend that surgical dressings are undisturbed for a minimum of 48 hours after surgery unless leakage occurs.

General recommendations include:

- Correct kennel selection (is isolation/barrier nursing needed?)
- Focus on exceptional five-point hand hygiene
- The availability and correct use of personal protective equipment
- Correct cleaning of clinical environments
- Correct ventilation
- The use of strict aseptic techniques (intravenous catheter care, blood sampling, urinary catheter care etc.)
- Removal of unnecessary indwelling devices as soon as no longer required
- Provision of high-quality nursing care

## KEY LEARNING OBJECTIVES

- What a hospital-acquired infection (HAI) is and the risks associated with them
- How to recognize a patient may have contracted a HAI
- Nursing measures used to help prevent HAI in the postoperative period

## MULTIPLE CHOICE QUESTIONS

1. What of the following is NOT an HAI?
  - (A) An infection that was present at the time of admission
  - (B) An infection acquired up to 48 hours after hospital admission
  - (C) An infection acquired up to 3 days after discharge
  - (D) An infection acquired up to 30 days after an operation

2. Any patient admitted to the hospital is at risk of contracting a HAI, but which of the following can increase that risk?
- (A) Extended antibiotic use
  - (B) Presence of indwelling devices (urinary catheters, intravenous catheters, chest drains etc.)
  - (C) Hypothermia
  - (D) All of the above

3. How long should a wound be covered to provide a physical barrier to protect the wound from contamination from the external environment until the it becomes impermeable to microorganisms
- (A) 12 hours
  - (B) 4 hours
  - (C) 24 hours
  - (D) 48 hours

## Difficult skin closures: what options do we have?

**Paul Aldridge**

With our veterinary patients we are frequently faced with potentially extensive wounds; these may be as a result of trauma or as a result of oncological surgery. When surgically reconstructing a wound it is essential that certain principles are adhered to: the wound edges should be apposed without tension, and drainage should be provided where appropriate. Both canine and feline skin is highly mobile and elastic, making very basic techniques viable to increase availability of skin at the wound margins. Where there is insufficient skin to achieve these goals, additional reconstructive techniques can be used to bring additional skin into the area to achieve closure. When selecting an appropriate technique, the simplest technique that allows tension free closure is usually the most appropriate

### PRIMARY CLOSURE WITH TENSION RELIEVING TECHNIQUES

- Undermining margins: a combination of sharp and blunt dissection below the panniculus muscle, to separate the skin from its deeper attachments and make use of the skin's natural elasticity
- Walking sutures: a subdermal bite of the skin beneath the edges, followed by a bite on the wound bed closer to the centre. As the knot is tightened the skin edges are advanced towards the centre of the wound. This distributes tension away from the suture line
- Tension-relieving incisions and mesh expansion: techniques where smaller adjacent incisions are made to reduce tension on the main suture line

### RANDOM SUBDERMAL PLEXUS FLAPS

These are skin flaps that rely on the randomly branching subdermal plexus for their blood supply. Because of this unpredictable blood supply, certain ratios in shape of the flap are adhered to and so preserve perfusion.

Examples include advancement flaps, rotation flaps and transposition flaps.

### AXIAL PATTERN FLAPS

These skin flaps rely on a direct cutaneous artery for their blood supply, as such their boundaries can be predicted from anatomical landmarks. This direct blood supply allows the creation of an often large, robust flap.

### FREE SKIN GRAFTS

Trafts are harvested usually from the trunk of the patient, and usually applied to a granulation bed. The graft has no blood supply initially, and relies on imbibition of plasma from the wound bed to maintain viability. Repeated dressing changes are usually required to protect the graft and allow 'take' to occur.

### KEY LEARNING OBJECTIVES

- Appreciate why reconstruction techniques are necessary in some wounds
- Learn about the various skin flap techniques available
- Learn about postoperative dressings and management of free skin grafts

### MULTIPLE CHOICE QUESTIONS

1. Which of these is not a passive wound drain?
  - (A) Yeates drain
  - (B) Corrugated drain
  - (C) Fenestrated drain and suction grenade
  - (D) Penrose drain
2. An advancement flap should have a length to width ratio that doesn't exceed which of the following?
  - (A) 4:1      (C) 2:1
  - (B) 3:1      (D) 1:1
3. Which of the following primary contact dressings are most appropriate for a free skin graft?
  - (A) Silicone mesh
  - (B) Allevyn
  - (C) Primapore
  - (D) Cotton gauze swabs

# Loco-regional blocks

**Louise O'Dwyer**

The use of local anaesthetic blocks, as part of a multimodal approach to analgesia, is potentially the most effective form of analgesia for many small animal surgeries, but also is often the most underused. For the majority of the blocks that will be discussed all that is needed is a syringe, a needle, local anaesthetic and a knowledge of the relevant anatomy. Technically these blocks do not require any specialist equipment, but nerve location equipment is recommended to guide perineural injections of local anaesthetics.

## HEAD/DENTAL BLOCKS

Many of these blocks can be used for dental procedures, mandibular and maxillary surgery. When deciding which block is appropriate in a given case, it should be remembered that only structures rostral to the injection site will be desensitized.

## RETROBULBAR OR PARABULBAR BLOCK

The retrobulbar block is useful for ocular surgery. The retrobulbar block involves injecting local anaesthetic behind the globe and will block cranial nerves II, III, IV, V (ophthalmic and maxillary branches) and VI. So, as well as desensitizing the globe, lids, conjunctiva and much of the upper face, it will block the extraocular muscles and therefore produce a central eye.

## INTRATESTICULAR BLOCKS

Intratesticular blocks are obviously a useful block to perform on castrations.

## LIMB BLOCKS

As orthopaedic surgery becomes more and more commonplace in general practice, most aspects of limbs can be desensitized using a number of different regional blocks.

### Brachial plexus block

Blocking the nerves of the brachial plexus will provide excellent analgesia for procedures below the elbow. The traditional brachial plexus (axillary) block, injecting approximately 10–15 ml of local anaesthetic (for a 25-kg dog) into the axillary space at the level of the point of the shoulder blocks the lower forelimb, but not the shoulder or the proximal humerus.

### Pelvic limb blocks

The sciatic nerve block may be combined with either a femoral nerve or lumbar plexus block to provide analgesia for pelvic limb surgery. Electro neurolocation is recommended for these techniques to improve accuracy,

ensure safety and reduce the dose of local anaesthetic required.

The sciatic nerve is blocked at its proximal location caudal to the greater trochanter of the femur. The puncture site is located at the junction of the cranial and middle thirds between a line drawn between the greater trochanter of the femur and the ischial tuberosity. The femoral nerve is blocked at its location on the medial aspect of the pelvic limb in the femoral triangle. The femoral artery is palpated within the femoral triangle, held in place with light digital pressure and the femoral nerve is located and blocked cranial to the artery, usually in a superficial location.

## INTERCOSTAL NERVE BLOCK

Intercostal nerve blocks are a useful analgesic adjunct for lateral thoracotomy surgeries, but also can be used to good effect to provide pain relief for rib fractures and for the placement of chest drains.

## CONCLUSION

Local anaesthetic techniques are easily employed in practice as part of a balanced, multimodal approach to anaesthesia and analgesia and should be considered where appropriate.

## KEY LEARNING OBJECTIVES

- Identify the local blocks which can be used for a variety of procedures, along with their anatomical landmarks
- Understand the local anaesthetic agents which are appropriate for use
- Gain confidence in performing the techniques in a clinical environment

## MULTIPLE CHOICE QUESTIONS

1. Which block may be useful for lateral thoracotomy surgeries, as well as rib fractures?
  - (A) Sciatic nerve block
  - (B) Intercostal nerve block
  - (C) Intratesticular block
  - (D) Retrobulbar block
2. Which block may be useful for ocular surgery?
  - (A) Sciatic nerve block
  - (B) Intercostal nerve block
  - (C) Intratesticular block
  - (D) Retrobulbar block
3. Which block may be useful in patients undergoing cruciate repair surgery?
  - (A) Sciatic nerve block
  - (B) Intercostal nerve block
  - (C) Intratesticular block
  - (D) Retrobulbar block

# Rehabilitation of orthopaedic patients

Holly Smith

Orthopaedic patients may suffer from swelling, oedema and pain after trauma or surgery. There are some very effective ways to alleviate these symptoms, helping to achieve increased mobility and comfort for the patient. Useful rehabilitation techniques are cold compression, hydrotherapy, physiotherapy and mobilizing the patient.

Hydrotherapy is hugely beneficial for many reasons in rehabilitation of the orthopaedic patient. The warm water can help soften muscles, loosen stiff joints and support weaker patients. Water allows the patient to be non-weightbearing, which will also contribute to pain relief and increased range of motion. Free swimming in a pool can lead to overextension of joints, which can lead to deterioration or pain. An underwater treadmill is much more controlled than free swimming in a pool. The level of the water, speed of the belt and incline or turbulence will determine how much support is being given, which muscle groups are being targeted and the amount of flexion or extension a joint goes through. This is also less strenuous for older, severely brachiocephalic patients or those who have had trauma to the thorax.

When carrying out rehabilitation on orthopaedic patients, it is also the muscle surrounding the injury or joint that is usually the most problematic, as it can be hypertonic, contracted or bruised. Oedema and inflammatory response swelling is also a problem which can limit the range of motion of a limb and be very painful. Cold compression is a very good treatment to reduce swelling and oedema in a limb. It will also provide pain relief for that limb or joint. The most effective way to achieve this is using a fully circumferential ice pack that can also deliver compression. There are cuffs available in the human field that can be used on dogs. These are cuffs that attach to a bucket of iced water and once the cuff is in place around the limb the bucket is lifted. The cuff fills through gravity and as it does so it will also deliver compression. This is far more effective than a solid cold pack held against a limb as the whole limb is

surrounded. The bucket can then be disconnected and the cuff left in place for 10 minutes.

Slow walking after a surgery or injury is also hugely beneficial as this will encourage weightbearing on affected limbs. Using hoists, slings and harnesses to get a patient up and moving is also important. Movement will also help to reduce oedema. Standing a patient in the pool or underwater treadmill can also reduce oedema due to hydrostatic pressure exerted by the water.

## KEY LEARNING OBJECTIVES

- Modalities used to treat oedema, swelling and pain in orthopaedic patients
- Why hydrotherapy is beneficial in orthopaedic patient rehabilitation
- Understanding the differences between free swimming and underwater treadmill

## MULTIPLE CHOICE QUESTIONS

1. What are we trying to reduce postoperatively after orthopaedic injuries or surgery?
  - (A) Swelling, oedema and pain
  - (B) Haemorrhage
  - (C) Weight bearing
  - (D) Patient mobility
2. Which rehabilitation techniques can be used to reduce oedema?
  - (A) Elevation
  - (B) Cold compression, hydrostatic pressure and slow walking
  - (C) Free swimming
  - (D) Passive range of motion, ice pack and free swimming
3. What properties does hydrotherapy have that are beneficial in reducing pain?
  - (A) Ability for patient to free swim
  - (B) To allow overextension of all limbs and range of motion
  - (C) Warm, non-weightbearing exercise
  - (D) Hydrostatic pressure

Friday 5 April  
Hall 11

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## (VN) Behaviour, welfare & ethics

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**Dog bite prevention: in practice or on the street?**  
Shakira Free Miles
- 227 09:10–09:55  
**Adopting street dogs: health and behaviour concerns**  
Heather Bacon
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**Good intentions and good welfare outcomes**  
Hayley Walters
- 228 11:45–12:30  
**Positive patient welfare: what the RVN can do**  
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**Acute pain and its welfare implications**  
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# Dog bite prevention: in practice or on the street?

## Shakira Free Miles

Dogs make up a large percentage of our patients, and come in a wide variety of shapes, sizes and breeds. All of them have experienced life differently and each of them is an individual. Treating them all the same is simply not an option. Dog bites are a constant risk within our job roles and dog bites outside the clinic are something that we should take seriously. Dog bites involve multiple factors, and understanding them requires going back to basics and unlearning some of the language we may use.

### DOG BITES

Dog bite incidents (DBI) occur at the clinic and may be seen as an occupational hazard, accepted and shrugged off, especially when the injury is considered minor. We are up close and personal constantly with dogs, sometimes we really do take their tolerance for granted. In my experience, veterinary professionals often miss or ignore the body language the dog is using in an attempt to reduce their own anxiety and communicate their emotions. I rarely hear staff discuss behaviour as part of a treatment plan or patient consideration, unless the animal is very aggressive and a danger. Creating a plan of action to include behavioural considerations is unusual, but in my opinion is vital to maintain good welfare.

We also have to remember that dogs under our care can and do bite people outside of our clinics, or may even cause a fatality. This is of course an extremely serious concern which may be preventable.

We should raise awareness among our veterinary colleagues of animal bites and their potentially devastating consequences. These incidents can result in profound physical and psychological damage and could be preventable.

### LANGUAGE AND LABELS

The language we use to describe patients may be innocent 'banter' or a word just thrown around without true meaning or thought. Labels can stick with that animal throughout their journey and care at the clinic; this can then impact on the handling and care of that patient with a label that may actually not be fact based. Such labels include 'evil', 'naughty', 'pain in the ass' ... the rest I won't write here. As a profession we should be using terminology that is fact based and based on the individual. We should also be asking ourselves questions as to why this behaviour has occurred.

### BREED GUESSING

The obsession and focus on breed is something that is a major damaging factor to understanding dog bites and the perpetuating misconceptions that almost fuel the

original myths and supposed rationale of breed-specific legislation (BSL) laws. The BVA and the majority of animal welfare organizations are against such unjust laws, as there is no evidence that supposed breed or conformation equates to risk. It is a subject that needs to be understood to ensure we send a safe and fact-based message. By focusing on supposed breeds/types and expectations it gives breed a level of importance.

For people working with animals, animal policy makers and veterinary staff, we must take responsibility for the language and labels used to describe the animal in our care or that we advocate for. These assumptions of breed we assign to individuals can carry serious consequences. They impact on people's perceptions and can influence policy makers' decisions, with a negative impact on dogs.

### KEY LEARNING OBJECTIVES

- Develop a deeper understanding how we can prevent dog bites in our profession
- Reconsider language and labels we assign to dogs
- Discuss advantages to change and inspire others in the team to do the same

### MULTIPLE CHOICE QUESTIONS

1. Why do dog bites in the clinic most commonly occur?
  - (A) Certain breeds are more likely to bite than others
  - (B) The dog hasn't been restrained correctly
  - (C) The dog's body language was ignored at the time or previously
  - (D) The dog was angry and didn't want to be handled
2. Who is responsible for dog bite prevention in the clinic?
  - (A) Veterinary surgeons
  - (B) Veterinary surgeons, veterinary nurses, reception, animal care staff, management and owners
  - (C) Veterinary surgeons and nurses
  - (D) Veterinary surgeons and owners
3. How should dogs considered dangerous be dealt with at the clinic?
  - (A) Be muzzled at all times and all team made aware of the behavioural concerns for that dog  
Be given pharmaceutical intervention, muzzled at all times, attend training and a CARE label placed on file/kennel
  - (B) Be given a behavioural consultation, pharmaceutical intervention, CARE label on file with description, plan of action
  - (C) Be given a behavioural consultation, consider pharmaceutical intervention, CARE label on file/kennel with description, plan of action, communicate with all staff involved, start muzzle training

# Adopting street dogs: health and behaviour concerns

**Heather Bacon**

Domestic dogs are thought to have originated at multiple geographic locations including Europe, the middle East, China and Russia. In some locations such as China and the Middle East, dogs may also have had genetic mixing with wolves since their domestication. Many of our modern dog breeds were created during the Victorian era, and this process of selective breeding has generated modern dog breeds with a wide variety of very specific conformations and some breed-specific behavioural traits, e.g. herding, retrieving etc. However with the introduction of the PETS scheme and greater international travel we are seeing increasing numbers of non-pedigree and ancient dog breeds in the UK, imported from regions of the world where the use and role of dogs in society is often very different.

Whilst some 'ancient' breeds are well known and familiar (Chow-chows, Akitas etc.), many street dogs of ancient origin are not classified as specific breeds but exist as 'landraces' or locally adapted, traditional varieties of dogs adapted to their region of origin. These types of dog make up the majority of the free-roaming dog population and are often referred to as 'street dogs'. Street dogs are likely to have experienced a greater diversity of genetic and environmental influences that may mean their behaviour is less familiar or predictable than highly bred pedigree breeds. Factors that may influence dog behaviour include genetics and breeding, temperament, early life experiences and socialization, later learning experiences, health status, personal motivation and environmental resources, and these are all factors which should be considered when interacting with dogs rehomed from overseas. Additionally, the process of rehoming and confining free-roaming dogs may impact on their behaviours. Whilst some of the challenges faced by these dogs may overlap with challenges faced by UK rescue dogs, dogs adopted from overseas may also present with specific behavioural or health challenges, not all of which may be picked up during the importation screening process.

This presentation will explore some of the health and behavioural issues that are common in street dogs and discuss how these issues might be considered when dealing with dogs adopted from abroad. Depending on the region of origin, such dogs may face a variety of potential health issues and may also present behavioural challenges that may be rather different to our more familiar UK pet dog population. This presentation will focus on behavioural issues contextualized by street dog ancestry and likely learning experiences, and give an overview of infectious disease challenges which may present in the veterinary clinic in dogs adopted from overseas.

## KEY LEARNING OUTCOMES

- Outline the different categories of dogs and appreciate the impact on genetic and behavioural diversity that breed may have
- Describe a variety of behavioural issues that may occur in street dogs and those dogs adopted from overseas
- Describe a variety of health issues that may occur in street dogs and those dogs adopted from overseas

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is considered to be an 'ancient' breed?
  - (A) Labrador Retriever
  - (B) German Shepherd Dog
  - (C) Afghan Hound
  - (D) St Bernard
2. Existing acute pain scales may be unreliable in street dogs due to the confound between pain behaviour and which other behaviour?
  - (A) Aggressive behaviour
  - (B) Fear/anxiety behaviour
  - (C) Maternal behaviour
  - (D) Escape behaviour
3. Where can transmissible venereal tumours be found?
  - (A) The genital area only
  - (B) The genitals and ears of dogs
  - (C) Any mucous membrane including genitals, eyes and oral cavity
  - (D) Any area of the body

# Good intentions and good welfare outcomes

**Hayley Walters**

We've all had the question at the end of a consultation I suspect. 'Can I just ask you quickly? What can I do about my dog growling when I go near him when he eats?'

Or 'My dog chews the front door and howls when I am at work. What can I do?' These questions, although commonplace, can often be difficult to answer during a busy consulting period. As well as carefully considering the health status of the animal in question, the answers rely on you taking a detailed behavioural history from the owner and recognizing the many other factors that contribute to 'behavioural problems' in dogs and cats, including their previous experiences, learned behaviours and how the owner has dealt with the problem previously. This is a great undertaking and a huge responsibility for a



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veterinary surgeon or veterinary nurse who may have limited training in treating behaviour problems. It's important that veterinary professionals recognize when a case is outside their area of competence and be prepared to refer it to a clinical animal behaviourist appearing on the Animal Behaviour and Training Council Register. The behaviourist can identify the motivational-emotional basis underlying the behavioural problem and design an appropriate behaviour-modification programme.

## FENCE AT THE TOP OF THE CLIFF OR AN AMBULANCE AT THE BOTTOM?

What can the veterinary surgeon or veterinary nurse do then? We can help to prevent these problems from developing in the first place by recognizing that we are well placed to educate owners on how to foster emotional resilience in their pets, resulting in good welfare outcomes. In other words, if they put the work in at the beginning, then the chance of a behavioural problem developing reduces. Understanding how animals learn and how owners inadvertently reinforce behaviour is key to advising owners on how to ensure emotionally stable, happy pets. Being able to read body language and understand the social structure of dogs and cats is also vitally important to avoid inadvertently creating the behavioural problems owners desperately want to prevent.

## KEY LEARNING OBJECTIVES

- Understand how an animal learns and how we reinforce their behaviour – good and bad
- Recognize the communication and body language that often precedes a dog bite – it's not about dominance!

- Be able to advise owners on how good intentions will lead to good welfare outcomes in a variety of common behavioural challenges

## MULTIPLE CHOICE QUESTIONS

1. Which of the following best describes the social structure of domestic dogs?  
(A) Similar to that of wolves  
(B) Linear dominance hierarchy  
(C) Solitary  
(D) Fluid and situation specific
2. What does it mean if a dog growls at you?  
(A) It has a behaviour problem  
(B) It must be punished as this is undesirable behaviour  
(C) It feels threatened and is asking for space  
(D) It is displaying dominant behaviour
3. Which of the following statements is NOT correct?  
(A) A suitably qualified behaviourist will be able to successfully treat all problem behaviours  
(B) All species of animals demonstrate behaviours for a reason  
(C) Various environmental and husbandry issues can contribute to the development of problem behaviours  
(D) Medical causes of behaviour problems must be ruled out prior to referral to a clinical animal behaviourist

## Positive patient welfare: what the RVN can do

### Hayley Walters

Most of us became veterinary nurses because we wanted to work with animals on a daily basis. We know that the patients we see are sentient beings, capable of feeling positive and negative emotions. However, as they can't speak, they often fail to receive the care they should. In busy, understaffed, or financially constrained practices, we may overlook aspects of their care. How can we do better?

We need to remember that welfare is a science and that a few simple changes to how a practice and its staff work can make a measurable impact.

How we measure welfare can be broken down into four main categories: environmental resources, physiology, physical state and behaviour. These 'welfare indicators' help us to assess an animal's situation or quality of life without emotion and so objectively measure its welfare state. When we note areas of concern, we can

suggest and implement improvements, and then re-measure the animal's welfare state.

It can be frustrating to work within time and financial constraints, but there are often many practical, quick and cheap things a veterinary nurse can do to ensure the patient's experience is as positive as possible. For example: provide puzzle feeders for long-term bored patients or hiding places for the scared, music therapy to reduce stress, recognize pain behaviours adeptly, adopt low-stress handling techniques, allow patients to sleep uninterrupted for at least 6 hours a night and coincide all of a patient's treatments, TPRs and examinations.

## KEY LEARNING OBJECTIVES

- Understand how patient welfare is compromised in the practice by considering the animal's behavioural, physical, physiological and environmental needs
- Recognize the practical steps a veterinary nurse can take to improve patient welfare with very little extra effort
- Appreciate that leading by example will help to create an environment of 'this is normal patient care' rather than the practical steps being considered 'extras'



## MULTIPLE CHOICE QUESTIONS

1. Music therapy can be one way of reducing stress in kennelled dogs. Which genre of music do dogs appear to enjoy most?
  - (A) Reggae and soft rock
  - (B) Heavy metal
  - (C) Pop and jazz
  - (D) Garage
2. When performing euthanasia on a dog or cat, why is it a good idea to consider using the saphenous vein?
  - (A) It allows the owners to be at the head of their pet and cuddle it as much as they want
  - (B) The saphenous vein is very rarely used so is often in better condition than the cephalic vein
  - (C) The animal is not used to having the saphenous vein used and therefore may be

- less anxious and not anticipate discomfort when the back leg is handled as it might the front
- (D) All of the above
3. Which of the following statements is NOT correct?
    - (A) Cortisol levels can rise temporarily during situations such as hunting, or mating and so raised cortisol is not always detrimental to an animal's health
    - (B) Measuring salivary cortisol levels and observing behaviour is not a reliable method to measure stress levels
    - (C) Stress can originate when an animal experiences a reduction in predictability of events
    - (D) Chronic stress and prolonged periods of raised cortisol levels can affect an animal's health

## Breed-specific legislation

### Shakira Free Miles

Breed-specific legislation (BSL) is hopefully a term known to all working within veterinary clinics, as something known to restrict and or kill dogs based on conformation and supposed breed type. It is a myth-based legislation that is outdated and not supported by any science to date.

### GOVERNMENT REVIEW AND CHANGES

A recent EFRA inquiry requested evidence from members of the public, professionals and government officials to review the effectiveness of BSL. It received a high volume of submissions, some from dog owners, victims of BSL, victims of dog bites, veterinary surgeons, campaign groups, animal welfare organizations, pet behaviour organizations, police and authorities. The outcome of this is currently pending (September 2018). Since 1991 this law has been responsible for failing dogs, and damaging their welfare and veterinary professional mental health, the tax payer, human safety and more. Multiple countries, cities and towns across the world have even banned BSL or repealed it, some have just reduced their restrictions or allow homing of suspected prohibited type dogs, but it is all progress supported by science.

### OUR RESPONSIBILITY

Breed guessing, breed label assigning, and interpretation and expectations of dogs based on their supposed breed are dangerous and do not benefit the dog at all. The BVA states it is not our responsibility to in enforce the law or

contact authorities based on a breed/type guess. The BVA also supports repealing this law as it is not evidence-based. We must ensure that we take responsibility for the language and labels we use to describe animals in our care that we advocate for. Shifting blames to other breeds, using 'deed not breed' statements are all based on myth and media conditioning, not fact. So it is not all about 'Pit Bulls', it is about all dogs and treating them as the individuals we know them to be. BSL targets a huge variety of dogs, and is not a piece of legislation that any government would truly support and enforce if they were serious about dog bite prevention (its original aim). Dog discriminatory laws are dangerous for people and dogs.

### KEY LEARNING OBJECTIVES

- Where the UK is currently in terms of breed-specific legislation (BSL) enforcement, science and outcome compared with other countries
- To explain our role in the veterinary profession to rid the UK of BSL
- To discuss our responsibility in regards to dog discrimination and true dog bite prevention

## MULTIPLE CHOICE QUESTIONS

1. Why does the UK have BSL?
  - (A) To reduce dog bites
  - (B) To reduce dog bites and eradicate the four prohibited type dogs
  - (C) To warn the public that certain dogs are more dangerous than others
  - (D) All of the above
2. What has BSL achieved?
  - (A) Dog bite reduction and education of value to people who are vulnerable to dog bite injuries

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- (B) Reduced 'Pit Bull' type dogs and other prohibited breeds
  - (C) Not reduced dog bites
  - (D) Not reduced dog bite injuries, caused unintentional serious animal welfare issues and cost the tax payer millions of pounds and has achieved no educational value
3. As veterinary surgeon or veterinary nurse what am I obliged to do if I suspect a dog of being a prohibited type?

- (A) Inform the police and hold the dog in the clinic
- (B) Place in the clinical records and breed label what I think the dog is and tell the owner to muzzle the dog and be wary around children
- (C) Do nothing and treat the dog like all other patients
- (D) Advise the owner to go to the police to get assistance

## Welfare of geriatric dogs and cats

**Heather Bacon**

Our pet dogs and cats are living longer than ever – but what does this mean for their welfare? As veterinary surgeons and veterinary nurses we are responsible not just for providing good physical welfare but also good behavioural and psychological welfare for our patients. However, this can be challenging for geriatric patients who may experience multiple co-morbidities, and who may often mask signs of their discomfort or distress. As animals age, cognitive and degenerative changes may impact upon their health and behaviour, as well as their psychological state. Whilst we often focus on the important physical changes that may occur with age, such as degenerative changes to organs or increased disease risks, it is just as important that we consider the psychological and behaviour impacts of ageing and how these may interact with physical degeneration.

This presentation will review common challenges in veterinary management of the geriatric patient, including cognitive dysfunction, pain and anxiety, and explore how these issues may present and impact upon the health and welfare of our veterinary patients. We will explore some of the ethical challenges of effectively managing geriatric patients and discuss the impact of common geriatric diseases on their welfare.

### KEY LEARNING OUTCOMES

- Describe some of the conditions commonly experienced by geriatric cats and dogs
- Discuss the challenges of managing diseases in geriatric patients
- Outline some of the ethical concerns around the management of geriatric cats and dogs

### MULTIPLE CHOICE QUESTIONS

1. Which of the following is a sign of senile cognitive dysfunction?
  - (A) Wall staring
  - (B) Toileting indoors
  - (C) Vocalizing
  - (D) All of the above
2. Non-steroidal anti-inflammatory drugs are NOT effective in the management of which of the following?
  - (A) Neuropathic pain
  - (B) Nociceptive pain
  - (C) Inflammatory pain
  - (D) Acute pain
3. What does good animal welfare comprise?
  - (A) Good health
  - (B) Physiological, physical and health
  - (C) Fitness, naturalness and feelings
  - (D) Food, water and shelter

## Animal welfare conundrums

**Heather Bacon**

Companion animal veterinary practice regularly raises ethical conundrums and generates many differences of opinion, both within the veterinary profession and through-

out our clients and society as a whole. This presentation will outline some of the issues we face when dealing with animal welfare and ethical challenges in veterinary practice, and will particularly focus on challenges which are common within the veterinary profession, and which we may inadvertently overlook.

It is well documented that routine practices are often unquestioned and may become part of an organizational or professional 'culture', but as our pet owners have increasing access to a variety of sources for information, the chances of routine practices coming under scrutiny grow. As we move

towards an increasingly evidence-based profession, traditional approaches to routine practices may be questioned.

This presentation will outline common practices in the management of our pet dogs and cats including socialization, neutering and behavioural management and explore some of the ethical challenges associated with these practices and the potential welfare impacts on our dogs and cats.

## KEY LEARNING OUTCOMES

- Describe the basic ethology of cats and dogs
- Outline the process of socialization for cats and dogs
- Discuss the practical and ethical challenges of informed consent

## MULTIPLE CHOICE QUESTIONS

1. Which of the following best describes behaviour of domestic cats?

- (A) Social
- (B) Solitary
- (C) Selectively social
- (D) None of the above

2. Which of the following is true of social behaviour in dogs?

- (A) It is learned
- (B) It is instinctive
- (C) It is only developed during training
- (D) It is only possible during the puppy socialization period

3. What does informed consent involve for clients?

- (A) They make the initial request for the procedure
- (B) They have the significance and main risks of the procedure explained to them
- (C) They are able to pay the bill
- (D) All of the above

# Acute pain and its welfare implications

## Hayley Walters

Surgery, unfortunately, is guaranteed to inflict pain on a patient. Acute pain is something every surgical patient will experience if we don't understand or recognize pain, and use appropriate analgesia. There are many practices for whom postoperative surgical pain barely exists for their patients. Pre-emptive analgesia is routinely given, animals are pain scored regularly and the analgesia plan reassessed accordingly. But there are other practices where full understanding, recognizing or treating pain does not occur, resulting in a level of suffering for their patients.

The reasons for not treating pain adequately are many. There are myths still obstructing some veterinary surgeons, such as 'Some pain is good', and there are practical challenges such as, 'I don't want the public to know I stock methadone'. There are knowledge issues, 'It's already had analgesia in its premed' and then there are financial concerns, 'The client won't want to pay for it' and analgesia is something that the owner must opt in for during the patient's surgical admission. And then there's habit, 'I've always done it this way.' Whatever the reason may be, not treating acute pain has welfare consequences as well as valid physical and physiological implications. Hypertension, tachycardia, increased stress response, anorexia, impaired wound healing, poor growth and weight gain, behavioural changes and sleep disturbances may occur when an animal experiences pain. The veterinary surgeon and nurse's declaration on

admission to membership of The Royal College of Veterinary Surgeons is '... ABOVE ALL, my constant endeavour will be to ensure the health and welfare of animals committed to my care', and therefore not only are there welfare, physical and physiological motives for treating pain adequately, but professional ones too.

Pain due to surgery is predictable, but suffering is optional.

## KEY LEARNING OBJECTIVES

- Understand how to recognize and measure pain and the multimodal approach to treating it
- Be aware of the myths and reasons for not treating pain
- Recognize the welfare implications for not treating pain and the benefits to treating pain

## MULTIPLE CHOICE QUESTIONS

1. When considering multimodal analgesia in dogs, which combination of drugs is NOT suitable?

- (A) Methadone, lidocaine, meloxicam
- (B) Methadone, paracetamol, ketamine
- (C) Buprenorphine, lidocaine, ketamine
- (D) Buprenorphine, meloxicam, methadone

2. Which of the following measures is NOT part of the Glasgow Composite Pain Scale for dogs?

- (A) Increased respiratory rate/panting
- (B) Slow or reluctant to walk
- (C) Growling/guarding on palpation of wound
- (D) Licking wound

## (VN) Behaviour, welfare & ethics

3. Which of the following statements is correct?

- (A) All post-surgical patients should go home wearing an Elizabethan collar to prevent licking and infection of the surgical site
- (B) A little bit of pain is good to stop the animal from moving too much and damaging the surgical site

- (C) It is correct to assume that if a procedure would be painful for a human then it will be painful for an animal
- (D) Renal failure cats that can't have a non-steroidal anti-inflammatory drug should have paracetamol instead

## Section IV

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# Veterinary nursing streams

Saturday 6 April

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Saturday 6 April  
Hall 9

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## (VN) Oncology

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- 236 08:15–09:00  
**Common cancers and paraneoplastic syndromes**  
Fiona McDowall
- 236 09:10–09:55  
**Oncology emergencies**  
Nicola Read
- 237 10:50–11:35  
**Staging the oncology patient**  
Nicola Read
- 238 11:45–12:30  
**Radiotherapy**  
Linda Roberts
- 239 13:50–14:35  
**Chemotherapy: administration and adverse effects**  
Fiona McDowall
- 240 14:45–15:30  
**Palliative care for cancer patients**  
Linda Roberts
- 241 16:35–17:25  
**Novel treatments: what's new and advances**  
Nicola Read
- 242 17:30–18:15  
**Client support for patients with terminal illness**  
Fiona McDowall

# Common cancers and paraneoplastic syndromes

**Fiona McDowall**

Paraneoplastic syndromes (PNSs) are defined as clinical signs or symptoms that can occur in a patient with cancer, however they are not due directly to local effects of the cancer cells. Substances that are not normally produced by the tumour cell of origin or abnormal amounts of substances produced by those cells are nearly always the cause of PNSs. Clinical signs induced by a tumour distant to its primary site, are often due to: hormone, cytokine, enzyme/peptide or hormone-like substance production.

PNSs may be responsible for more morbidity and mortality than the actual tumour itself, with effective treatment of the PNS requiring control of the underlying malignancy. Recognition of a PNS increases the efficiency of diagnosis by revealing an underlying mass and/or narrowing differentials. Some PNSs are emergencies and therefore require prompt treatment before the tumour is diagnosed. As the PNS usually resolves after effective treatment, return of the PNS can be used as a marker of remission status. Failure to recognize an underlying tumour often prolongs morbidity and can lead to long-term complications and unnecessary expense, for example, renal failure in mismanaged hypercalcaemia.

PNSs can be endocrinological, haematological, neurological, cutaneous and miscellaneous in nature. Common cancers associated with PNSs include lymphoma,

multiple myeloma, haemangiosarcomas, anal sac adenocarcinomas and thymomas.

This lecture will discuss PNSs and their associated tumours along with their systemic effects and appropriate nursing treatments.

## KEY LEARNING OBJECTIVES

- Identify common cancers and their associated paraneoplastic syndromes (PNSs)
- Discuss the systemic effects of PNSs and recommended treatments
- Determine appropriate nursing protocols

## MULTIPLE CHOICE QUESTIONS

1. Polyuria and polydipsia are systemic effects commonly seen with which of the following?  
(A) Hypercalcaemia  
(B) Hypoglycaemia  
(C) Hyperglobulinaemia  
(D) Anaemia
2. Myasthenia gravis is a neurological PNS commonly associated with which of the following?  
(A) Haemangiosarcoma  
(B) Multiple myeloma  
(C) Thymoma  
(D) Mast cell tumours
3. Cancer cachexia can be associated with which of the following tumour types?  
(A) Intestinal and hepatic tumours  
(B) Haemangiosarcomas  
(C) Renal and nasal tumours  
(D) All of the above

# Oncology emergencies

**Nicola Read**

Patients with underlying oncological disease can be presented for a myriad of reasons as an emergency to the clinic. Here we discuss some presentations where neoplasia would be high on the differentials list.

Ruptured viscera is the most common oncological emergency; organ rupture due to an invasive tumour can be malignant in origin. Emergency surgery is usually the only treatment to save the animal's life, however this comes with risk that the animal may have significant life-limiting metastatic disease. Appropriate preoperative preparation includes restoration of circulating volume, ideally with whole blood, and wherever possible complementary imaging to assess metastasis to the lung parenchyma or abdominal organs. Splenic haemangiosarcoma is a likely cause, with a median survival time of approximately

2 months reported for patients undergoing splenectomy alone, and this plays a significant impact in the decision making for the management of these cases.

Pleural effusion, pericardial effusion, haemoptysis and respiratory obstruction can all be neoplastic in origin. Patients with effusions usually have a progressive history but if the fluid accumulation is haemorrhagic in origin, acute deterioration can be a result of a bleed caused by an invasive lesion. Initial stabilization should be focused on symptomatically supporting the patient with centesis, oxygen therapy, medical management and persistent, frequent monitoring whilst the diagnosis is investigated. Imaging of the thoracic cavity by means of 'thoracic-focused assessment with sonography for trauma' (T-FAST), can help provide a clinical picture and identify any lesions whilst at the same time allow for guided biopsy.

Patients presented with hypercalcaemia of malignancy are classically polydipsic and polyuric. Other clinical signs include dysuria, weakness, lethargy, altered behaviour and tremors. Potential causes include lymphoma, anal sac



gland carcinoma or parathyroid tumour in the dog and oral squamous cell carcinoma in the cat. Patients presented with the listed clinical signs can also have significant damage to soft tissue structures from persistent calcium aberrations. Attempts can be made to stabilize the patient with fluids and diuretics and the administration of calcium bisphosphonate, but ultimately subsequent treatment of the primary cause will help normalize the patient's calcium levels.

Seizure activity related to a malignant cause can either be primary, secondary or paraneoplastic in origin. Primary brain tumours are common in brachycephalic breeds and, although many are categorized as benign, due to growth of the lesion they have a catastrophic effect. Treatment options are usually surgical or radiation but the primary emphasis is on stabilization through reduction of swelling with hypertonic fluids and anti-seizure medication whilst the owner is advised about prognosis and treatment options. Secondary brain tumours from metastatic lesions can spontaneously bleed, therefore the re-presentation of an oncology patient with seizures may have this high up on the differentials list.

Other emergencies of neoplastic cause include urinary or intestinal obstruction, acute blindness, haemorrhagic gastroenteritis, polycythaemia, acute lameness, and sepsis. In addition, patients undergoing treatment for their cancer may suffer ill-effects from their therapy and be represented to the clinic with severe adverse reactions. This subject is discussed in more detail within the oncology nursing stream.

## KEY LEARNING OBJECTIVES

- Build confidence to assist with some of the main oncological emergency cases presented in general practice
- Assist with tests which can help narrow down a diagnosis quickly in the emergency patient
- Build on mindfulness when dealing with patients and clients with cancer in the emergency situation

## MULTIPLE CHOICE QUESTIONS

1. Patients presented with hypercalcaemia could have which of the following neoplastic causes?
  - (A) Anal sac carcinoma
  - (B) Lymphoma
  - (C) Parathyroid tumour
  - (D) All of the above
2. What aggressive tumour has the highest incidence of re-presenting with metastatic brain lesions?
  - (A) Soft tissue sarcoma
  - (B) Haemangiosarcoma
  - (C) Osteosarcoma
  - (D) Fibrosarcoma
3. Patients with leukaemia may present with which of the following?
 

(A) Haemorrhage	(C) Anaemia
(B) Sepsis	(D) Any of the above

# Staging the oncology patient

## Nicola Read

The stage of a tumour is defined in simple terms as the extent of the neoplastic disease. It is an expression of the tumour volume and the degree of tumour spread – both locally and to distant sites. Tumour stage is of great importance in determining therapeutic options and prognosis, two concepts which are inextricably linked as each more or less defines the other.

Strictly speaking we should differentiate clinical stage from pathological stage. Clinical stage classically summarizes the information from non-invasive procedures, while pathological stage determination requires information from a pathologist's inspection of excised tissue; the latter provides data of higher quality but requires more invasive testing, e.g. cytological examination of a pulmonary lesion in a patient with a splenic tumour.

All procedures performed on a patient carry certain costs and in some cases risks (through sedation, general anaesthesia and haemorrhage of biopsy site), therefore it is not appropriate to perform the same clinical staging evaluations on all patients with neoplastic disease.

The decision to undertake clinical staging procedures is made on the veterinarian's clinical reasoning that the test will be beneficial in the further management of the case; by this they need to have a strong working knowledge of the clinical behaviour of the tumour. Factors that will define the evaluations performed will include tumour type, tumour grade and accompanying clinical signs. For example, the grade of a mast cell tumour (MCT) is likely to influence the veterinary surgeon's (veterinarian's) recommendations from limited investigations (more likely for grade I cutaneous MCT), in contrast to full staging with advanced imaging and aspirates (more likely for grade III MCT). In summary, proceeding with extensive surgery without knowledge of the patient tumour stage may be contraindicated.

Clinical staging through diagnostic imaging can be undertaken using a variety of imaging modalities; choosing which to use will be based on the tumour type and location, plus availability to the veterinary surgeon. Essentially the purpose of imaging is to determine the tumour's architecture and invasive extent plus facilitate performance of a biopsy for pathological staging.

The sentinel node is the hypothetical first lymph node or group of nodes draining a cancer location and this is the target for pathological staging. Assessment of the node for metastatic spread can be determined through invasive sampling via direct or image guided biopsy. Cytological sampling is usually undertaken as a fine-needle aspirate. Representative samples via tissue

# (VN) Oncology

core, punch or excisional biopsy can be also be used, however it will take longer for these to be analysed by the pathologist. Bedside assessment (prior to sample submission) to determine cellular yield can help speed up the staging process and allow for the staging picture to be communicated to the owner as soon as practicably possible.

Finally, advances in immunocytochemistry, immunohistochemistry (specialised staining) and DNA testing can help subcategorize certain cancers, therefore providing the caregivers with more information to help predict how the animal's cancer is likely to behave and or whether the neoplasia is likely to respond to available treatments.

## KEY LEARNING OBJECTIVES

- Understand the reasons for staging a patient with neoplasia
- Appreciate the pros and cons of each imaging modality
- Apply and/or improve practical sampling techniques

## MULTIPLE CHOICE QUESTIONS

1. What system do we often use when assessing the staging of a patient?  
(A) Size, spread, invasion  
(B) Size, symptoms, behaviour  
(C) Tumour, node, metastasis  
(D) Tumour, symptoms, metastasis
2. For what type of tumour is magnetic resonance imaging (MRI) most useful?  
(A) Lymphoma (C) Meningioma  
(B) Osteosarcoma (D) Pulmonary carcinoma
3. Which of the following tests can be indicated for a patient diagnosed with suspected lymphoma on cytology?  
(A) Polymerase chain reaction (PCR) for antigen receptor rearrangements (PARR)  
(B) Immunocytochemistry  
(C) Flowcytometry  
(D) Any of the above

# Radiotherapy

## Linda Roberts

Radiation therapy (RT) is the locoregional medical use of ionizing radiation to control malignant disease. In veterinary oncology, it may be used with curative intent, but is also used as adjunctive or palliative therapy. RT may be used alone, or in conjunction with surgery and/or chemotherapy, or other treatment protocols.

RT is an effective treatment modality for animals but availability has been limited until recently. Now that is more accessible in the UK, with many cases being 'care-shared' between multiple centres and between first- and second-opinion practices, it is very relevant for veterinary nurses and general practitioners to have a working understanding of the process, uses and patient-management protocols.

RT is mainly used for local treatment for solid tumours, with/without surgery and chemotherapy; it may also be used for some systemic tumour treatment (e.g. half-body radiation for lymphoma), as well as for palliative care (e.g. analgesia for bone pain). Patients require general anaesthesia for each treatment, which is carefully planned for, and may be administered intensively (e.g. three to five times weekly) or less so (e.g. weekly).

Ideally the RT dose should cause high tumour cell kill, but spare normal cells; however, RT is not cancer cell specific, and produces damaging ionization within cells which affects cell survival, so careful planning (with advanced imaging modalities) and collimation are essential to protect healthy tissue and only target neoplastic cells as far as possible.

Types of RT include:

- Internal (brachytherapy):
    - Radiopharmaceuticals in cavities, tumours or systemic
    - Patient is radioactive until implant is removed or material metabolized
    - Rarely used in veterinary medicine
  - External (teletherapy) – beam directed at tumour:
    - Orthovoltage 150–500 kVp (X-rays)
    - Megavoltage >1 MeV, cobalt 60 or linear accelerator (photons and electrons)
- RT may be delivered as photons or electrons, and is administered via:
- Teletherapy
  - Orthovoltage
  - Megavoltage – linear accelerator
  - Megavoltage – cobalt 60

Side effects of RT are broadly divided into acute and late reactions. Acute effects (occurring immediately after treatment) may include effects on rapidly dividing tissues, including normal cells; signs include erythema, desquamation and/or ulceration, oral mucositis, halitosis, skin erythema and conjunctivitis. Acute effects usually resolve spontaneously, generally 2–3 weeks after treatment ends, with symptomatic treatment being used to effect, depending on the signs seen, the location and the patient-specific needs. Chronic/longer-term effects may be seen months to years after RT ends, with slowly dividing tissues being affected, e.g. bone and connective tissue. These are potentially serious and irreversible, but are not seen as commonly as acute effects in veterinary patients due to the fact that most tumours are being managed/palliated, therefore prognosis may be limited; and the naturally shorter lifespans of small animal patients (i.e., in comparison with humans). Side effects

are minimized by dividing treatments into fractions, which gives time for normal cells to repair, for cells to move into a more susceptible stage of the cell cycle and for cancer cells to reoxygenate and become more susceptible to damage. This also allows patients to rest and enjoy increased welfare.

## KEY LEARNING OBJECTIVES

- To understand the common indications, uses and side effects of veterinary radiation therapy
- Gain insight into ways that veterinary nurses may be involved in and care for cancer patients undergoing radiation therapy
- Gain knowledge and understanding of the key concepts of radiation therapy, including the methods applied, schedules and outcomes expected through its use

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is NOT a common, acute side effect of RT?

- (A) Mucositis
- (B) Bone tumours
- (C) Desquamation
- (D) Conjunctivitis

2. RT commonly used in veterinary medicine may include which of the following?

- (A) Teletherapy, orthovoltage, megavoltage and orcanotovoltage
- (B) Rontomerotherapy, orthovoltage, teletherapy and megavoltage
- (C) Megavoltage, brachylovoltage, orthovoltage and teletherapy
- (D) Brachytherapy, megavoltage, orthovoltage and teletherapy

3. Which of the following cancers is NOT routinely treated using RT?

- (A) Mast cell tumours in dogs and cats
- (B) Small cell/gastrointestinal lymphoma in cats
- (C) Analgesia for bone pain, e.g. osteosarcoma
- (D) Nasal carcinomas in cats and dogs

# Chemotherapy: administration and adverse effects

**Fiona McDowall**

The prevalence of various types of cancer in companion animals is high, so it is critical that veterinary practices are equipped to deal with the growing demands for advanced treatments. It has been reported that one in four dogs and one in six cats will develop cancer in their lifetime, with 50% of dogs over the age of 10 years dying from cancer-related complications. These figures highlight the importance of case throughput in companion animal practice.

Treatment protocols for cancer vary according to the tumour type, grade and stage of disease. Treatment will include either one of the following: chemotherapy, surgical oncology, radiation therapy or a combination of treatments. This lecture will discuss the administration and adverse effects of chemotherapy only. The prescribing of cytotoxic drugs is extensive throughout the UK and the potential for occupational exposure of staff is therefore high. With this increased use of cytotoxic drugs, it is essential that all staff members are educated in the potential risks to those administering them, the immediate and delayed side effects for the patients receiving them, and the safe handling and disposal of cytotoxic waste for both staff members and clients. The toxicity of

cytotoxic drugs has been well documented with many known as, or suspected to be, human carcinogens; they may also be mutagenic, teratogenic and some cause tissue irritation.

The majority of cytotoxic drugs are either administered orally in the form of tablets or capsules, or by intravenous injection. It is essential that the registered veterinary nurse (RVN) is competent in the correct route of administration of cytotoxic drugs, as some drugs may cause a fatal anaphylaxis if given incorrectly. As there are risks in the handling of cytotoxic drugs, individual practice policies and standard operating procedures should be in place to minimize risk of exposure to staff within the practice, the patients and owners of the animals being treated. Exposure to cytotoxic drugs includes absorption, inhalation and self-inoculation.

Although the majority of chemotherapy protocols used in companion animal practice are designed to have a low incidence of adverse effects they can occasionally occur, with general delayed adverse effects including bone marrow suppression, gastrointestinal effects and alopecia. Immediate side effects can also occur and include anaphylaxis and extravasation.

## KEY LEARNING OBJECTIVES

- To gain a thorough understanding of how to prepare and administer cytotoxic drugs safely
- To appreciate the adverse effects which can occur with cytotoxic drug administration
- To acknowledge the advice clients require on discharge of patients that have received chemotherapy

## MULTIPLE CHOICE QUESTIONS

1. If extravasation occurred during the administration of vincristine which of the following should you NOT do?  
(A) Apply a cold compress to the area  
(B) Apply a hot compress to the area  
(C) Place an Elizabethan collar on the patient  
(D) Inject the area with hyaluronidase

2. Which of the following cytotoxic drugs can cause haemorrhagic cystitis?  
(A) Vincristine (C) Doxorubicin  
(B) Vinblastine (D) Cyclophosphamide
3. What is the unique toxicity of lomustine?  
(A) Renal toxicity  
(B) Hepatic toxicity  
(C) Cardiotoxicity  
(D) Neuropathy

## Palliative care for cancer patients

### Linda Roberts

The ideal in veterinary oncology is to aim for curative outcomes in the treatment of cancer-bearing patients, however management/control of the disease may be the reality for some, with palliative care being important for ongoing welfare.

Palliative care may be undertaken for various reasons, e.g. the primary cancer, or its metastases, are too far advanced for definitive treatment; the owner's wishes, beliefs, and/or finances; the presence of other life-limiting comorbidities; the patient's emotional health/behavioural welfare, etc. Many of the treatment options/standards of care for all types of cancers apply in the palliative setting, for example surgery, chemotherapy, radiotherapy and adjunctive treatments to maintain good quality of life. The intention and outcome objectives shift, however, from welfare and longevity, to control of clinical signs, maintenance of optimum comfort and an 'every day must be a great day' focus, i.e. with minimum 'borrow' for maximum 'payback' for the patient. Regardless of the reason(s), limitations, or goals, compassionate care of all patients, cancer patients included, requires they are kept as free as possible from the adverse effects of their illnesses and treatment.

Palliative care in cancer patients may take many forms, including monitoring of the primary illness; analgesia management; maintenance of optimal nutritional +/- hydration status; management of comorbidities; assessment of ongoing therapies; lifestyle modifications, etc. Therefore, registered veterinary nurses (RVNs) are well placed to assess for, and provide, key aspects of palliative care in veterinary cancer therapy. RVNs are the patient's advocate, acting as key liaison between the veterinary care team(s), educating and communicating with owners, and monitoring day-to-day quality of life and welfare.

With our increasing population of pets living to greater ages, cancer is common – it is mainly a condition of older age, and the cause of death in up to one in four patients. Many more (than those that die from cancer) senior pets are living with cancer, and being well managed, with some other condition being their eventual cause of death. Therefore much of the routine care provided to all senior pets, and/or those with chronic illness, applies to how we can apply our nursing skills to the

acute and chronic care of cancer patients, particularly in the palliative care setting.

Palliative care, in which RVNs may be involved, includes:

- Pain and comfort assessment/management – RVNs are key in managing pain, by constant re-evaluation, tailoring of analgesic protocols in liaison with the clinician, communication with owners and addressing patients' changing needs
- Treatments such as non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroids, small-molecule-inhibitors, immunotherapy, emerging tailored therapies, adjunctive/complementary therapies and modalities, e.g. acupuncture and physiotherapy
  - Also, often chemotherapy and/or radiotherapy
- Ongoing monitoring of whole-patient health and welfare
- Nutritional advice/intervention where appropriate. Meeting clinical nutritional requirements is important in cancer care. Owners often need assistance with this too
  - Feeding tube placement and management; dietary calculations and tube care; owner instruction on tube use/care

RVNs may also facilitate palliative care via wellness clinics, aimed at keeping cancer-bearing pets enjoying great, long-term quality of life, making a real difference to the lives of owners and their cancer-bearing pets.

## KEY LEARNING OBJECTIVES

- To understand the reasons for, and limitations and goals of palliative cancer care
- Gain insight into ways in which all aspects of veterinary nursing care may be applied to care of cancer patients undergoing palliative care
- Gain knowledge and understanding of the key concepts of cancer palliation

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is NOT commonly used in palliative cancer care?  
(A) Multimodal analgesia  
(B) Homeopathy  
(C) Radiation therapy and chemotherapy  
(D) Feeding tubes for maintenance of hydration and calorie intake

2. Which of the following is NOT an option in veterinary oncology palliative care?
  - (A) Limb amputation for painful pathological fractures
  - (B) Radiotherapy for analgesia of bone pain
  - (C) Corticosteroid use for control of a tumour's clinical signs
  - (D) Aggressive surgery, with protracted recovery times and curative intent
3. Which of the following is NOT part of veterinary nurse input in palliative care of cancer patients?

- (A) Communication and liaison on all aspects of care between all parties involved with the patient
- (B) Intensive 'no pain, no gain' exercise and physiotherapy plans for post-surgical patients
- (C) Attention to the emotional well-being of the patient, including measures to alleviate distress
- (D) Continuous assessment of behaviours and clinical signs to discern comfort and quality of life

## Novel treatments: what's new and advances

### Nicola Read

Companion animals share their environment with their owners; therefore a lot of comparisons to human oncological diagnostics and treatments are being identified. During this lecture, some of the advances of veterinary oncology are discussed.

As veterinary clinical pathology advances, there has been much more availability in the UK to order specialized staining and DNA testing to allow for neoplasms to be identified and categorized. Immunohistochemistry, immunocytochemistry, flow cytometry and polymerase chain reaction (PCR) for antigen receptor rearrangement (PARR) can help identify biological markers that can help distinguish a neoplasm, which can allow for better prediction of prognosis and sometimes likely treatment response.

Immunotherapy works to protect and boost the immune system; it enables the body to block cancerous pathways and promote the power of cytotoxic T cells, enhance the checkpoints of the cell cycle and activate other immune responses, such as antigen presentation and cytokine release. In some human patients with lymphoma and melanoma, immunotherapy works well, so similar therapies have been made available to companion animals. Solid tumours, however, have a poor response, so surgery, radiation and chemotherapy remain necessary treatments. Research is currently underway to assess tumour response to immunotherapy for our companion animals.

Non-surgical procedures are slowly becoming available in specialist practices that offer an alternative to traditional surgical techniques. Photodynamic therapy (PDT) is commonly used for human head and neck cancers by using a light source combined with a photosensitizing agent to destroy cancer cells. PDT has demonstrated good efficacy in feline squamous cell sarcoma. Electrochemotherapy (ECT) is a treatment used for superficial tumours; a dose of chemotherapy is injected systemically or into the lesion before an electrical current is passed

through the mass with an electrode. ECT is used currently for equine sarcoids and its efficacy has been documented for a number of other companion animal tumours.

Rabacfosadine is marketed to target and kill lymphoma by inhibiting DNA synthesis; it is administered intravenously every 3 weeks for five doses and has a reported 77% response rate. This new medication requires a named patient special treatment licence and so is currently limited to a small number of veterinary specialists in the UK. As expected of any chemotherapy treatment, adverse effects are still likely and so far rabacfosadine has yet to become a go-to treatment before traditional therapies; more positive research on efficacy would support this promising treatment option and may help reduce the visits and cost of treating canine lymphoma in the future.

An increasing number of specialized surgeons are using interventional radiography to offer a wider range of palliative methods to improve quality of life for locally malignant tumours, in particular stenting of the urinary tract. Chemoembolization is offered by a handful of specialized oncology centres. The procedure involves catheterization of the lesion to deliver a dose of chemotherapy in the form of microbeads that occlude the small vessels supplying the mass and provide a concentrated dose of cytotoxic drugs.

### KEY LEARNING OBJECTIVES

- What progression has there been in veterinary oncology treatments to date and what the future may hold
- Identification of specialist treatments available to patients with certain types of cancer
- Understanding of what diagnostic tests are available to allow for better categorization of tumours

### MULTIPLE CHOICE QUESTIONS

1. What type of canine visceral tumour has had a positive response to chemoembolization?
  - (A) Hepatic
  - (B) Splenic
  - (C) Pancreatic
  - (D) Gastric

2. What is the name given to chemotherapy treatments administered in small, regular doses?
- (A) Systematic
  - (B) Metronomic
  - (C) Teratogenic
  - (D) Methodical

3. For what type of tumour can a stent improve survival time and quality of life?
- (A) Pulmonary carcinoma
  - (B) Glioblastoma
  - (C) Mast cell tumour
  - (D) Transitional cell carcinoma

## Client support for patients with terminal illness

**Fiona McDowall**

Compassion is core to nursing practice and it is essential that all registered veterinary nurses (RVNs) develop the skills necessary to communicate support and compassion to their patients as well as the patient's owners, as the nurse–client bond is central to the delivery of nursing care. Compassionate communication skills are essential for the RVN involved in the care of patients with terminal cancer, as this will facilitate minimizing fears associated with pain, suffering and death, aiding in informed decision making, discussing complex medical information and guiding clients through the physical and emotional difficulties associated with cancer.

Communicating with clients whose animals are approaching their end of life (EOL) can be stressful and emotional for pet owners and RVNs alike, therefore, timely, empathetic and non-judgemental communication is vital for effective client support. Post-euthanasia support is invaluable for clients, however EOL care requires owners to make immense decisions prior to their pet's death at a time when they feel vulnerable and need support. An understanding of grief models will facilitate the RVN in providing an appropriate level of support. How the veterinary team responds to client grief plays a vital role in the client experience and their continued loyalty to the practice upon the loss of their pet. Communication is inevitable, unavoidable and one of the most common skills employed by the veterinary health team. The use of non-verbal communication skills such as shaping space and developing non-verbal rapport skills are essential for the RVN, as 80% of all communication between the client and the RVN is non-verbal and largely involuntary, with only 20% of communication involving verbal and voluntary acts.

This lecture will discuss various types of verbal and non-verbal communication techniques and the support clients require when making EOL decisions. Consideration will be given to the use of grief models in practice and how an understanding of these models can benefit clients.

### KEY LEARNING OBJECTIVES

- To develop an understanding of the use of verbal and non-verbal communications skills
- To establish the support required by grieving clients
- To identify and understand the various stages of the grieving process

### MULTIPLE CHOICE QUESTIONS

1. The Kubler-Ross five stages of grief model consists of which of the following?
  - (A) Denial, anger, acceptance, bargaining and depression
  - (B) Rejection, hatred, acceptance, bargaining and depression
  - (C) Disapproval, anger, acceptance, bargaining and hopelessness
  - (D) Denial, annoyance, acceptance, bargaining and sorrow
2. When do clients start to grieve for their pets?
  - (A) Once euthanasia has been performed
  - (B) Clients don't grieve for their pets
  - (C) When the animal starts to show clinical signs of a terminal illness post diagnosis
  - (D) On diagnosis of a terminal illness
3. What is the term used to describe grief which occurs before an impending loss?
  - (A) Prepared grief
  - (B) Adapted grief
  - (C) Anticipatory grief
  - (D) Expectant grief

Saturday 6 April  
Hall 10

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## (VN) Medicine

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- 244 08:15–09:00  
**Inflammatory bowel disease**  
Gina Parkes
- 244 09:10–09:55  
**Diabetes mellitus: let's not sugar coat it!**  
Gina Parkes
- 245 10:50–11:35  
**Feline diabetes: they are not small diabetic dogs!**  
Gina Parkes
- 246 11:45–12:30  
**Diabetic ketoacidosis**  
Gina Parkes
- 247 13:50–15:30  
**Haematology**  
Rachel Pickles  
**Blood transfusions, products and monitoring**  
**Common bleeding disorders**
- 249 16:35–18:15  
**Endocrinology**  
Rachel Pickles  
**Feline hyperthyroidism**  
**Hyperadrenocorticism and hypoadrenocorticism**



# Inflammatory bowel disease

**Gina Parkes**

The topic of gastrointestinal (GI) disease can be a confusing one that is difficult to think about in a clear and coherent manner due to the large range of variables associated with it. There are so many different questions that a clinician must answer in order to successfully treat a patient with GI disease that, as nurses, it can sometimes result in us simply caring for the patient without fully understanding the reasons for the clinical signs that they are showing.

In most of our careers, we commonly encounter and nurse patients with GI disease. We witness our clinicians investigating whether our patient may have 'upper' or 'lower' GI tract clinical signs, have acute or chronic disease, or may have clinical signs associated with primary or secondary disease – but what does this all mean in relation to our patients' GI disease? More importantly, where does inflammatory bowel disease (IBD) fit in?

The term 'IBD' is an umbrella term that has been historically used in practice to describe chronic idiopathic clinical signs associated with inflammation of GI mucosa. The ambiguous use of the term can cause increased confusion for nurses trying to understand the topic.

In current practice, a disease that causes chronic lower GI tract clinical signs is referred to as a chronic enteropathy. Within the bracket of chronic enteropathy diseases, a patient can suffer from any of the following: food-responsive diarrhoea, antibiotic-responsive diarrhoea and steroid-responsive disease, i.e. primary inflammatory disease (previously could be called IBD). Incorrect diagnosis of a patient's disease can dramatically vary the treatment, cause considerable delay in recovery, and be detrimental to both the patient and the client.

Raising awareness of the importance of a food trial in patients presenting with chronic lower GI signs is crucial. Patients with food-responsive diarrhoea will commonly respond to an elimination diet within 2–4 weeks and therefore undergo much less invasive therapy and intervention associated with attempting to diagnose disease

caused by antibiotic-responsive diarrhoea and steroid-responsive disease. Knowledge of our patient's nutritional needs and an understanding of the importance of client compliance during a food trial is crucial. In order to successfully assist the clinician in practice when identifying the underlying cause of a chronic enteropathy, as well as supporting the client and providing a high standard of care, a competent nurse must understand the pathophysiology and the relevance of the terms IBD and chronic enteropathy.

## KEY LEARNING OBJECTIVES

- Understanding lower gastrointestinal disease
- Chronic enteropathy vs. Inflammatory bowel disease terminology
- Nursing considerations for patients suffering from chronic enteropathies

## MULTIPLE CHOICE QUESTIONS

1. What type of disease could a patient with a chronic enteropathy have?
  - (A) Nutrition-deficiency disease, steroid-responsive disease, antibiotic-responsive diarrhoea
  - (B) Food-responsive diarrhoea, steroid-responsive disease, antibiotic-responsive diarrhoea
  - (C) Indigestion, malabsorption, emesis, diarrhoea
  - (D) Food-responsive diarrhoea, steroid-responsive disease, antibiotic resistance
2. What does the term IBD stand for?
  - (A) Inflammatory bowel deficiencies
  - (B) Inflammatory bowel diarrhoea
  - (C) Infectious bowel disease
  - (D) Inflammatory bowel disease
3. How long does it typically take for a patient to respond to a successful diet trial?
  - (A) 7–10 days
  - (B) 5–6 weeks
  - (C) 2–4 weeks
  - (D) 0–7 days

# Diabetes mellitus: let's not sugar coat it!

**Gina Parkes**

Diabetes mellitus has a range of underlying causes that can vary depending on the species, age and health of our patient. Studies in recent years have highlighted major differences in both canine and feline diabetic disease processes and, as such, an increase in the need for careful diagnosis and greater treatment compliance. Various

underlying reasons for patients to present in a hyperglycaemic state range from insulin secretion abnormalities to insulin resistance, or an inability for glucose to enter the tissues once it has reached them. Causes include genetic, immune-mediated, idiopathic, or secondary to endocrinopathies or other disease.

So what happens if the treatment that a patient is receiving does not match the reason that the patient is hyperglycaemic? How do we care for our patient and support our client if they do not have the money to pay for investigation into why their pet is diabetic but would still want to treat them? Alternatively, what does it mean for our patient's health if a client cannot comply with our recommended treatment protocol?



As veterinary nurses we are strategically involved in the management of diabetic patients throughout our career. We will often see our diabetic patients come back to the practice repeatedly for re-examinations, blood glucose curves and further tests or changes to treatment. We ask for a lot of compliance from our diabetic patient pet owners and may not always stop to think of whether the patient's and client's quality of life at home is being severely affected.

Weighing up the balance of client support to sustain a manageable treatment regime while avoiding the consequence of poor glycaemic control that can induce life-threatening diabetic ketoacidosis is difficult. Diabetic cataracts, systemic hypertension, proteinuria, neuropathy and nephropathy are some of the secondary clinical problems associated with diabetes mellitus. Offering a gold standard level of nursing care means that we should fully understand the secondary clinical signs and seriousness of this long-term disease. We should aim to offer support to the client while helping them to comply with treatment that is achievable within their means and lifestyle. A client that is comfortable with the treatment regime and cost is more likely to continue treatment for longer.

As competent nurses, we should recognize the seriousness of diabetes mellitus for both the patient and the client. Understanding the gravity of the disease while helping the client to give their pet the best treatment they can sustain, will give the best outcome for both patient and client.

## KEY LEARNING OBJECTIVES

- Complications associated with diabetes mellitus
- The importance of a good assessment of the quality of life of clients and pets
- The impact of poor compliance on our patients' health

## MULTIPLE CHOICE QUESTIONS

1. Which of the following will patients with diabetes mellitus commonly present with?
  - (A) Systemic hypotension, proteinuria, anuria, polydipsia

- (B) Systemic hypertension, proteinuria, polyuria, polydipsia
- (C) Pulmonary hypertension, tachycardia, polyuria, polydipsia
- (D) Hypertrophic cardiomyopathy, proteinuria, polyuria, polydipsia

2. As competent nurses, which of the following should we do?

- (A) Ensure we are knowledgeable on the disease processes in order to support the client appropriately. Encourage the client to comply with the best treatment that they can afford within their budget and lifestyle
- (B) Ensure we are knowledgeable on the disease processes in order to support the client appropriately. Encourage the client to comply with the most up-to-date advanced treatment regardless of the cost
- (C) Ensure we are knowledgeable on the disease processes in order to support the client appropriately. Encourage the client to comply with the most up-to-date treatment if it is cheap, regardless of the intensity of the regime
- (D) Try to support the client without fully understanding the disease state that their pet is suffering from or could deteriorate into

3. Which of the following are underlying causal factors of diabetes mellitus in cats and dogs?

- (A) Genetics, breed, secondary to a blood disorder, immune-mediated
- (B) Genetics, lifestyle, secondary to an endocrinopathy, immune-mediated
- (C) Lifestyle, breed, dental health, immune-mediated
- (D) Lifestyle, depression, dental health, immune-mediated

# Feline diabetes: they are not small diabetic dogs!

**Gina Parkes**

Insulin is a hormone that is produced in the endocrine pancreas and functions to allow glucose to enter the target cells within the tissues in both dogs and cats. While both species produce and metabolize insulin in a similar way within our healthy patients, there can be major differences between the underlying factors driving the disease processes of canine and feline diabetes mellitus.

When looking at how we complete successful patient care for feline diabetes within practice, it is useful to break down the whole package into three main sections of care: the investigation and treatment of the disease, the nursing care and the client support.

Canine patients most commonly suffer from insulin-dependent diabetes mellitus related to a combination of genetics, poor lifestyle and immune-mediated destruction of pancreatic beta cells, that closely resembles type 1 diabetes in humans. In contrast, studies in recent years have highlighted that feline diabetic patients are more likely to present with disease that has more similarities to human type 2 diabetes. While genetics and endocrinopathies also play a part, lifestyle management in cats is now considered to play a major role in the successful treatment of feline diabetes. Almost as important as insulin therapy, good lifestyle management is key to

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management of the disease due to the serious damage that obesity causes in compounding injury through islet amyloidosis to an already poorly functioning endocrine pancreas.

Gold-standard nursing care for feline diabetes patients asks that we understand the disease processes behind the treatment in order to nurse to best of our ability. Feline patients require a comprehension of the species character and a commitment to feline friendliness throughout their care. Nursing a cat through its diabetic investigation and treatment pathway should involve a careful and considered approach that means we assess every aspect of our nursing and reflect on our handling, housing, equipment, environments and training.

The journey of treatment of feline diabetes can be a difficult and frustrating one for our clients. Feline patients do not routinely stay indoors around the clock like their canine counterparts. Many cats are not reliable and routine feeders. Clients often struggle with the results of the mistrust that occurs through repeated trips to the vet and the insulin injections. Games of attempting to catch the cat indoors at the treatment time and inject during feeding time to trick the cat become normal routine. Cats are natural hunters and, if they spend vast amounts of time outdoors, clients may struggle to monitor their health. All of these problems as well as many more can cause anxiety to our clients and remove the joy of being a pet owner. As nurses, understanding the problems that our cat owners face and the difficulties associated with treatment of a cat, means that we can better support our clients and that they may continue with the enjoyment and treatment of their pet for longer.

### KEY LEARNING OBJECTIVES

- Differences in underlying causes for diabetes mellitus in cats vs. dogs
- Nursing-care considerations for feline diabetes mellitus

- Client-support considerations for feline diabetes mellitus

### MULTIPLE CHOICE QUESTIONS

1. Which underlying causes are more commonly associated with diabetes mellitus in cats?
  - (A) Genetics, obesity, immune-mediated, cardiopathies
  - (B) Genetics, obesity, endocrinopathies, cardiopathies
  - (C) Genetics, obesity, endocrinopathies, islet amyloidosis
  - (D) Genetics, infection, endocrinopathies, islet amyloidosis
2. Gold-standard nursing care for feline diabetes mellitus patients asks that we reflect on which of the following?
  - (A) Handling, housing, equipment, environments and training
  - (B) Handling, housing, equipment, cost and grooming
  - (C) Speed of service, cost, training and recruitment
  - (D) Speed of service, cost, training and equipment
3. Which of the following are aspects of home care of a diabetic cat which may cause anxiety for the owner?
  - (A) Feeding, palpating, monitoring, owner enjoyment
  - (B) Feeding, injecting, monitoring, owner enjoyment
  - (C) Fasting, palpating, monitoring, owner enjoyment
  - (D) Fasting, injecting, monitoring, owner enjoyment

## Diabetic ketoacidosis

### Gina Parkes

Diabetic ketoacidosis (DKA) is a life-threatening and serious metabolic state that occurs most commonly to patients suffering from diabetes mellitus, where a diminished level of insulin or an inability to use insulin that is produced, results in a serum hyperglycaemia. The cells in the body are unable to use the circulating glucose for its intended purpose and the body attempts to source energy through the breakdown of fatty acids to triglycerides and ketone bodies or ketones.

In a healthy patient, insulin will suppress the production of glucose in the liver at times of hyperglycaemia, and glucagon released by the alpha cells of the pancreas will cause glycogen to convert to glucose at times of

hypoglycaemia. The two hormones work together to maintain homeostasis of glucose levels.

In a patient with reduced insulin levels, despite the excess glucose in circulation, tissues in the body that are starved of energy cause the liver to produce further glucose through both gluconeogenesis and glycogenolysis. As mentioned, free fatty acids are converted to triglycerides and ketone bodies and some tissues are able to use ketones for energy. In a healthy patient, a certain level of ketone bodies is normal, however in a persistent hyperglycaemic state, the ketone levels surpass the patient's ability to metabolize them. Increased levels of acidic ketones in the bloodstream may cause the pH of the blood to drop and the patient develops DKA.

Patients with DKA will commonly have excess levels of ketones and glucose in the blood that overspill in the urine and take electrolytes with them. Electrolyte imbalances, such as hypokalaemia, along with dehydration, that is compounded further by fluid loss through

vomiting and diarrhoea, can cause serious and rapidly deteriorating disease. Treatment for patients diagnosed with DKA therefore starts with administration of fluid therapy and electrolyte correction. Glucose levels are commonly corrected acutely and micromanaged using soluble insulin therapy in these patients.

There are many nursing considerations for patients with DKA. Patient comfort and cleanliness during times of severe illness and lethargy are key to ensuring patient demeanour remains as good as it can. Placement and maintenance of central lines are useful for reduced venous blood sampling. Intense monitoring during times of soluble insulin administration and fluid electrolyte resuscitation are crucial, as serum potassium levels along with other electrolytes will drop when the electrolytes move back into the intracellular space, in line with an increase in blood pH and insulin administration. Hypoglycaemia is also a possible complication of treatment with soluble insulin.

Interstitial fluid glucose monitors can help in the assessment and ongoing care of patients on insulin in the monitoring of glucose levels in a non-invasive manner. Going forward, client support is key. These monitors can improve control of the disease through use at home, offering increased client compliance if supported appropriately by the knowledgeable and competent nurse.

## KEY LEARNING OBJECTIVES

- Why diabetic ketoacidosis (DKA) occurs in the diabetic patient
- Nursing considerations of DKA
- How to use an interstitial fluid glucose monitor

## MULTIPLE CHOICE QUESTIONS

1. What is DKA?
  - (A) A serious metabolic state in which the bloodstream pH falls and electrolyte imbalances occur

- (B) A serious metabolic state in which the blood stream pH rises and electrolyte imbalances occur
  - (C) A normal metabolic state in which electrolytes spill over in the urine due to excess electrolytes in the body
  - (D) A serious metabolic state in which the blood pH falls and electrolytes are normal
2. Nursing considerations for a patient with DKA can include which of the following?
  - (A) Electrolyte monitoring, ensuring patient is awake, central line maintenance, interstitial fluid glucose monitoring
  - (B) Electrolyte and glucose monitoring, ensuring comfort and cleanliness, central line maintenance, interstitial fluid glucose administration
  - (C) Electrolyte and glucose monitoring, ensuring comfort and cleanliness, central line removal, intracellular fluid glucose monitoring
  - (D) Electrolyte monitoring, ensuring comfort and cleanliness, central line maintenance, interstitial fluid glucose monitoring
3. Which of these statements is correct?
  - (A) Glucose and glycerol work together to allow glucose levels to remain balanced
  - (B) Insulin and glycerol work together to allow glucose levels to remain balanced
  - (C) Insulin and glycogen work together to allow glucose levels to remain balanced
  - (D) Gluconeogenesis and potassium work together to allow glucose levels to remain balanced

# Transfusion medicine and common bleeding disorders

**Rachel Pickles**

## Blood transfusions, products and monitoring

There are different blood products available to treat different specific diseases and deficiencies in the most effective way.

Whole blood contains both red blood cells and plasma. This can be used to treat symptomatic anaemia,

platelet deficiencies and coagulation deficits in the absence of a suitable component.

Packed red blood cells are obtained from whole blood that has been centrifuged, where the red blood cells and the plasma are separated. This can be used to treat symptomatic anaemia.

Fresh frozen plasma is plasma that has been frozen immediately after collection. It contains clotting factors V, anti-haemophilic (VIII) and von Willebrand factor. This is used for the treatment of clotting factor deficiencies and disseminated intravascular coagulation (DIC), for plasma volume expansion and plasma protein replacement.

Frozen plasma contains albumin and other plasma proteins fibrinogen, factor VII and factor IX. It is used in the treatment of deficiencies of the clotting factors and plasma protein deficiencies.

Cryoprecipitate is a plasma fraction that has been separated from whole plasma. It is used specifically for inherited clotting factor deficiencies.

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Cryosupernatant contains non-labile clotting factors fibrinogen, factor VII and factor IX. It also contains albumin and other plasma proteins. It is used for the treatment for most clotting factor deficiencies except haemophilia A and von Willebrand disease.

There are blood typing kits available to test for canine DEA 1.1. If a dog has not had a previous transfusion, it can be given either positive or negative type blood. To be safe in case further transfusions are required, it is best practice to blood type first. If a patient requires further blood transfusions cross-matching is necessary if more than 72 hours have elapsed since the last transfusion, to avoid transfusion reactions.

Blood typing kits are available for feline type A, B and AB. Blood typing should always be carried out in the case of feline transfusion and the wrong type could be fatal. Type A is the most common type in Domestic Shorthair cats.

Frequent monitoring during a blood transfusion is vital. For the initial hour, temperature, pulse rate, quality and rhythm, respiratory rate, depth and pattern should be monitored every 15 minutes. If no transfusion reactions are evident in this time, recording vital parameters can be performed every 30 minutes until the end of transfusion. It is advised that for the first hour of the transfusion the rate should be gradually increased as this is when most reactions will occur. Packed cell volume should be measured before and after the transfusion to assess the success of the transfusion and treatment. The demeanour and behaviour of the patient should also be closely monitored, and cardiac and thoracic auscultation should be performed. Urine output is another parameter that is significant.

Blood transfusion reactions include weakness, depression, tremors, agitation, vocalization, tachypnoea, dyspnoea, tachycardia (bradycardia in cats), arrhythmias,

salivation, nausea, vomiting, diarrhoea, angioedema, urticaria, seizures, coma and cardiopulmonary arrest. Transfusion reactions are undetectable under general anaesthesia.

### KEY LEARNING OBJECTIVES

- To understand the different blood products available
- To be able to monitor a patient during blood transfusion
- To be able to identify signs of transfusion reactions and know how to minimize them

### MULTIPLE CHOICE QUESTIONS

1. What would you use cryoprecipitate plasma to treat?  
(A) Symptomatic anaemia  
(B) Hypoalbuminaemia  
(C) von Willebrand disease and haemophilia A  
(D) Platelet deficiency
2. Which of the following is not a symptom of a blood transfusion reaction?  
(A) Vomiting  
(B) Tachypnoea  
(C) Urticaria  
(D) Hypothermia
3. If a patient requires a second blood transfusion, cross-matching is required after how long?  
(A) 24 hours  
(B) 72 hours  
(C) 1 hour  
(D) 1 week

## Common bleeding disorders

### IMMUNE-MEDIATED HAEMOLYTIC ANAEMIA

Immune-mediated haemolytic anaemia (IMHA) can be primary or secondary. In primary IMHA, the immune system mistakenly produces antibodies that attack its own red blood cells. This is the most common cause of anaemia in dogs.

Secondary IMHA can be caused by cancer, infection, blood parasites, drug reactions, snake bite, certain chemicals and toxins and bee stings or other allergic reactions. It might occur as a vaccination reaction (controversial).

History and clinical findings may show pale mucous membranes, lethargy and weakness, increased respiratory rate, tachycardia, anorexia, weight loss, melaena and pica.

Presence of spherocytes on a blood smear is typical of IMHA. A positive saline autoagglutination is also indicative.

Treatment of primary IMHA is administration of immunosuppressive medication. Thromboembolism is a common complication of IMHA. Prognosis is guarded.

### IMMUNE-MEDIATED THROMBOCYTOPENIA

Immune-mediated thrombocytopenia (ITP) occurs when the immune system makes antibodies that destroy platelets or platelet-producing cells in the bone marrow. Clinical signs are petechiae of the gums and skin or larger bruising called ecchymosis, melaena and epistaxis. An evaluation of the bone marrow may be necessary to help determine if circulating platelets or the platelet-forming cells are targeted by the antibodies. Immunosuppressive therapy is often the treatment. A blood transfusion may be necessary for anaemic dogs. If an animal has repeated episodes of the disease, the spleen can be removed. Vincristine can be given to temporarily increase platelet count. Soft food is fed to minimize gingival bleeding. Cystocentesis, intramuscular injections and jugular venepuncture in patients with severe thrombocytopenia must be avoided. Direct pressure should be applied to any venepuncture or injection site for 5 minutes to ensure haemostasis.

Middle-aged dogs are most commonly affected by ITP, but the disease can occur in dogs of any age. A high prevalence has been reported in Miniature, Toy, and standard poodles, Cocker Spaniels, Old English Sheepdogs and German Shepherd Dogs but any breed may be affected.

## VON WILLEBRAND DISEASE (VWD)

VWD is caused by defective or deficient von Willebrand's factor. It is the most common inherited bleeding disorder in dogs and occurs in any breed. There is an over-representation of Dobermanns, German Shepherd Dogs, Golden Retrievers, Miniature Schnauzers, Pembroke Welsh Corgis, Shetland Sheepdogs, Basset Hounds, Scottish Terriers, Standard Poodles, and Standard Manchester Terriers.

Clinical signs include bleeding of the gums, nose bleeds and blood in the urine. Some puppies may bleed excessively after vaccination, microchipping or surgery. Laboratory tests are required to confirm the diagnosis. Active bleeding episodes may require transfusion with whole blood or plasma.

## HAEMOPHILIA A (FACTOR VIII DEFICIENCY)

Females carry the gene for the disease without showing any signs, while males show signs. In affected puppies, prolonged bleeding is seen from the gums during teething and after surgery. Lameness due to bleeding into a joint, sudden clot formation, and oozing of blood in the body cavity also are common signs in dogs. Treatment requires repeated transfusions of whole blood or plasma until bleeding has been controlled.

## KEY LEARNING OBJECTIVES

- To understand the common immune-mediated and inherited deficiencies that require blood products
- To identify the clinical presentation and clinical signs of these diseases
- To know which is the best blood product to use in these diseases

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is not a cause of secondary IMHA?
  - (A) Cancer
  - (B) Drug reactions
  - (C) Snake bite (allergic reaction)
  - (D) Immune system reaction
2. Which of the following is not a clinical sign of ITP?
 

(A) Petechiae	(C) Dysuria
(B) Melaena	(D) Epistaxis
3. Which of the following is a common complication of IMHA?
 

(A) Thromboembolism	(C) Hypocoagulation
(B) Volume overload	(D) Polyarthrits

# Endocrinology

Rachel Pickles

## Feline hyperthyroidism

Feline hyperthyroidism is the most common endocrinopathy of the geriatric feline patient. Thirty percent of hyperthyroid cases have hyperplasia of one thyroid gland and 70% of cases affect both thyroid glands. The cause of hyperthyroidism remains unknown.

Hyperthyroidism is a disease that affects middle-aged to older cats. Average age of onset is 12–13 years. Clinical signs include polyuria, polydipsia, weight loss, raised liver enzymes, hyperactivity, gastrointestinal signs and polyphagia. Clinical findings can be palpable thyroid goitre, cardiac murmur, tachycardia and a dull hair coat. A total T4 blood test result above the reference range gives a diagnosis in 90% of cats.

There are multiple approaches to treatment of hyperthyroidism. Treatment of feline hyperthyroidism can decrease the glomerular filtration rate (GFR), raising serum urea and creatinine values, occasionally unmasking renal failure.

Surgery is often curative and is a quick procedure in experienced hands. There is a very high risk of hyperthyroidism reoccurring if a unilateral thyroidectomy is carried out. The anaesthetic risk is increased in elderly

patients and there is also a higher risk of intraoperative bleeding. In addition, the possibility of developing hypocalcaemia after bilateral thyroidectomy is high. Medical management prior to surgery is recommended short term to normalize T4 and reduce tachycardia. Surgery has irreversible effects on the GFR.

Medical management is easy to implement. Methimazole is available in tablets, to be taken once or twice daily, liquids or topical gels. This method avoids anaesthesia, is reasonably inexpensive and the GFR effect is reversible. Some owners may find it difficult to give their cat daily medication. Poor compliance and side effects, such as vomiting, diarrhoea, anorexia and dermatological changes, have been reported.

Radioactive iodine treatment is a safe, simple and single treatment that does not involve anaesthesia or surgery. It is the most effective definitive treatment (curative in 95% of cases) with rapid effect. Authorized facilities are required, working closely with the Radiation Protection Adviser. Whilst the cats are hospitalized after iodine therapy no physical contact is allowed except in cases of emergency. Staff looking after the cats wear personal protective equipment (PPE) to enter the isolation ward. Radiation dose monitors are worn by staff. Levels of radiation of the cats are monitored using a Radhound contamination monitor. Staff also monitor themselves using the Radhound monitor before and after entering the isolation ward. Demeanour, appetite, respiratory rate and pattern, together with urine and faecal output are monitored twice a day. Hospitalization is required for 7–14 days post treatment. After treatment

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owners must keep their pet indoors for a further 17 days and close contact must be restricted. Soiled litter must be stored, double bagged and sealed for 3 weeks and can then be disposed of normally. Follow-up bloods tests are required to monitor success.

A specialized diet needs to be fed exclusively. It is not ideal for a multicat household. It is recommended the cat stays indoors to ensure it cannot access any other food source.

### KEY LEARNING OBJECTIVES

- To comprehend the clinical signs and presentation of hyperthyroid cats
- To understand the different treatment methods of hyperthyroidism
- To be aware of the side effects and complications of hyperthyroid treatment

## Hyperadrenocorticism and hypoadrenocorticism

The adrenal cortex is responsible for mineralocorticoid (aldosterone) and glucocorticoid (cortisol) production. The medulla is responsible for catecholamine production (dopamine, norepinephrine and epinephrine).

Aldosterone's release is influenced by the renin-angiotensin-aldosterone system and by plasma potassium levels. It is essential to the maintenance of electrolyte balance and extracellular fluid volume. Aldosterone regulates blood volume and systemic blood pressure. Cortisol release is controlled almost entirely by adrenocorticotrophic hormone (ACTH). Cortisol controls blood pressure, vascular reactivity of catecholamines, counteracts the effects of stress in the body and the immune system response.

A lack of glucocorticoids would indicate hypoadrenocorticism (atypical Addison's disease) and an excess would indicate hyperadrenocorticism (Cushing's disease).

### HYPERADRENOCORTICISM

There are three types of hyperadrenocorticism: excessive secretion of ACTH, pituitary-dependent (PDH 80–85%), functional adrenal tumour (ADH 15%) and iatrogenic causes.

Hyperadrenocorticism usually affects middle-aged to older dogs. Any breed can be affected, however Toy Poodles, Dachshunds and small terriers are over-represented (PDH). Adrenal tumours occur more frequently in larger dogs.

Clinical signs are polyuria and polydipsia (90% cases), polyphagia, raised liver enzymes, low urine specific gravity, weight gain, abdominal distension, muscle weakness, lethargy, panting and hair loss (symmetrical truncal alopecia).

Endocrine testing involves the ACTH stimulation test and low-dose dexamethasone suppression test

### MULTIPLE CHOICE QUESTIONS

1. What percentage of feline hyperthyroid cases have bilateral disease?  
(A) 15% (C) 90%  
(B) 50% (D) 70%
2. Which is the following is a clinical sign of hyperthyroidism?  
(A) Weight gain (C) Polyphagia  
(B) Bradycardia (D) Lethargy
3. Which of the following is a possible complication of surgical thyroidectomy?  
(A) Increased urea and decreased creatinine  
(B) Decreased urea and increased creatinine  
(C) Hypocalcaemia  
(D) Hyperglycaemia

(LDDST). Various diagnostic imaging is helpful in diagnosis.

Treatment is with trilostane, medication that blocks adrenal synthesis of glucocorticoids and mineralocorticoids. Nursing care is very important. These patients will need regular blood tests and monitoring of vital signs. Bruising can occur after blood sampling, so observation for haematoma formation is vital. Blood samples should be taken 4–6 hours post trilostane and the treatment should be indicated on laboratory submission forms. These patients should always have access to water and frequent opportunities to urinate.

### HYPOADRENOCORTICISM

Hypoadrenocorticism may be a primary disease due to adrenal gland disease or secondary due to pituitary problems. The most common primary diseases is an immune-mediated destruction of the adrenocortical layers, resulting in deficiencies of mineralocorticoids and glucocorticoids. It usually affects young to middle-aged dogs. Dog breeds over-represented are Standard Poodles, Leonbergers and German Shepherd Dogs. Females are also over-represented.

Hypoadrenocorticism can present as an emergency (Addisonian crisis), and the patient may be collapsed, hypovolaemic, bradycardic, have melaena and other gastrointestinal signs. It can also present with a gradual-onset history, often waxing and waning. Most commonly anorexia, vomiting and diarrhoea, lethargy, weakness, poor weight gain, painful muscle cramps or collapse when stressed are seen. Blood test analysis will most often show hyperkalaemia and hyponatraemia, non-regenerative anaemia and a lack of a stress leucogram. Abdominal ultrasonography is used as a diagnostic aid. An ACTH stimulation test provides definitive diagnosis.

Treatment for the acute presentation is fluid therapy, correction of hyperkalaemia and glucocorticoid therapy. Patients can respond very rapidly. Treatment for chronic cases is medical management with glucocorticoid and mineralocorticoid therapy.

Nurses will play a large part in the initial triage and then monitoring the patient's therapy. Initially monitoring vital signs and clinical signs, together with regular blood tests, is required. Hospitalized patients should be encouraged to eat. Long-term management is required as well as client support.

## KEY LEARNING OBJECTIVES

- To understand the difference between hyper- and hypoadrenocorticism
- To be able to identify the clinical signs and presentation of patients with hyper- and hypoadrenocorticism
- To be able to monitor patients with both diseases and to understand the treatments available

## MULTIPLE CHOICE QUESTIONS

1. What percentage of hyperadrenocorticism cases have functional adrenal tumours?  
(A) 85% (C) 5%  
(B) 50% (D) 15%
2. Which of the following is a clinical sign of hypoadrenocorticism?  
(A) Tachycardia (C) Vomiting  
(B) Polyphagia (D) Constipation
3. Which of the following is NOT a laboratory finding in hypoadrenocorticism?  
(A) Hyperkalaemia  
(B) Hyponatraemia  
(C) Non-regenerative anaemia  
(D) Low urine specific gravity





Saturday 6 April  
Hall 11

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## (VN) Anaesthesia

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- 254 08:15–09:00  
**The pre-anaesthetic exam**  
Emma Archer
- 255 09:10–09:55  
**Anaesthesia of the head trauma patient**  
Denise Prisk
- 256 10:50–11:35  
**Anaesthesia of the RTA cat**  
Claire Woolford
- 257 11:45–12:30  
**Anaesthesia of the brachycephalic patient**  
Denise Prisk
- 258 13:50–14:35  
**Anaesthesia for the young and old**  
Emma Archer
- 259 14:45–15:30  
**Anaesthesia of the acute abdomen**  
Claire Woolford
- 260 16:35–16:55  
**Central lines**  
Claire Woolford
- 261 17:00–17:20  
**Arterial lines**  
Claire Woolford
- 262 17:30–18:15  
**Anaesthesia and analgesia of patients with complex medical conditions**  
Emma Archer

# (VN) Anaesthesia

## The pre-anaesthetic exam

Emma Archer

The importance of preoperative preparation cannot be overemphasized to optimize patient safety and to minimize the risk of complications under anaesthesia or postoperatively, and preanaesthetic patient assessment is an important part of this. A logical approach to the pre-anaesthetic assessment means important considerations are less likely to be missed.

### SIGNALMENT

Once informed consent has been obtained in writing along with owner contact details and specific considerations such as 'do not resuscitate', the species, breed, age, gender and whether they have been neutered should be assessed and recorded. Knowledge of breed characteristics and specific medical conditions applicable to particular breeds may provide information about anaesthetic considerations or concerns. For example, brachycephalic breeds (Pugs, Bulldogs, French Bulldogs etc) often have brachycephalic obstructive airway syndrome (BOAS). Additionally, there is a high incidence of Von Willebrand factor deficiency in Dobermanns, putting them at risk of inadequate coagulation and excessive surgical haemorrhage. Miniature Schnauzers, particularly females, may have occult sick sinus syndrome, often normal on physical examination, but severe bradycardia may become apparent under anaesthesia.

### REASON FOR SURGERY/PRIMARY COMPLAINT

Duration and severity of complaint, abnormal physical signs and treatment administered are recorded.

### COMPLETE MEDICAL HISTORY

It is important to be aware of any pertinent medical history or concurrent illnesses as these may affect the anaesthetic protocol, such as concurrent heart disease or diabetes mellitus. Good record keeping in your veterinary practice can also provide useful information with regard to previous anaesthesia and any adverse effects.

### FASTING AND WATER DEPRIVATION

Based on evidence suggesting prolonged withholding of food increases the risk of regurgitation and makes stomach contents more acidic, a starving time of around 4–6 hours is usually suggested.

### PHYSICAL EXAMINATION

A full clinical examination should be performed in the week before the anaesthetic by a veterinary surgeon. On the day of the anaesthetic a brief clinical examination should be performed including the following.

### Body condition

Patients can easily be assigned a body condition score ranging from 1–9 (1 being cachexic and 9 obese) to aid anaesthetic planning.

### Cardiovascular system

Peripheral pulses should be palpated to assess, quality, rate and rhythm. The pulse should be felt concurrently to auscultating the heart to check that the pulse is synchronous with the heart beat and there are no pulse deficits. The heart should be auscultated for murmurs or arrhythmias. Peripheral pulses should be used as they are more sensitive to changes in circulating volume than central pulses, hopefully identifying inadequate circulation such as hypovolaemia or haemorrhage more easily. Mucous membrane colour and capillary refill time should be recorded.

### Pulmonary system

Respiratory rate, depth and pattern should be assessed at rest. The lungs should be auscultated all over to listen for breath sounds and any areas of diminished breath sounds, crackles or wheezes identified.

### CONCURRENT DRUG USE

Patients may present already on drugs for pre-existing conditions. A knowledge of these drugs and how they may affect the patient under anaesthesia as well as when they were last administered is important.

### BLOOD TESTS

If the patient is 'sick' or elderly, a blood sample for packed cell volume/total protein (PCV/TP), urea and creatinine should be analysed.

### KEY LEARNING OBJECTIVES

- To understand the nurse's role in preanaesthetic assessment
- To understand the importance of performing a preanaesthetic assessment
- To understand how the anaesthetic protocol can be adapted according to parameters identified in the preanaesthetic examination

### MULTIPLE CHOICE QUESTIONS

1. Which of these is most useful to examine during the immediate preoperative examination?
  - (A) Dorsal metatarsal artery and cardiac auscultation
  - (B) Femoral artery and cardiac auscultation
  - (C) Dorsal metatarsal artery and lung sounds
  - (D) Any artery with cardiac auscultation
2. Why do brachycephalic breeds need special consideration under anaesthesia?
  - (A) They are at risk of upper respiratory tract obstruction in recovery

- (B) They can be difficult to intubate due to an elongated soft palate, stenotic nares and hypoplastic trachea  
(C) They are at greater risk of regurgitation  
(D) All of the above

3. For how long prior to anaesthesia is it currently recommended to withhold food in dogs and cats?  
(A) Withholding food is not necessary  
(B) 4–6 hours  
(C) 8 hours  
(D) <3 hours

# Anaesthesia of the head trauma patient

Denise Prisk

Anaesthesia of patients with head injuries brings specific challenges, as any disruption to brain activity can affect the anaesthetic process. In addition, drugs may behave differently in these patients. It is important to have a basic understanding of neuroanatomy and neurophysiology, in order to be aware of any problems that patients with head injury and trauma can experience.

Head injuries may present as one of several types, depending on the cause. Primary injury is trauma incurred as a direct result of injury, for example, mechanical injury. Because of the composition of the brain tissue and lack of support, forces to the skull and brain are not well tolerated. Secondary injury occurs as an indirect result, which may be subsequent to the primary injury or it may be that there is a systemic reason that is not related to, or in the absence of, a primary injury. Examples include hypotension, hyper- and hypoglycaemia, hypoxia, hypercapnia or a very high temperature. The consequences include increased intracranial pressure (ICP), decreased cerebral delivery of oxygen and damage to the blood–brain barrier. Polytrauma patients, such as those involved in road traffic accidents, will often have some sort of head or brain injury that may not be immediately apparent. A full assessment should be undertaken prior to anaesthesia, to detect the presence of brain injury. The quicker any injury is detected, the better the chances of a positive outcome.

The main goals for anaesthesia of the patient with head injury are to preserve brain tissue and neuronal function and to prevent secondary injury. Cerebral perfusion must be maintained as hypoxaemia leads to cerebral vasodilation with a subsequent increase in ICP. Venous drainage must be preserved and careful positioning is required – a head-up position of 15–30 degrees is recommended, as long as there are no spinal injuries. The neck must be level and it is preferable to incline the entire patient on a board or using bedding.

The use of capnography for monitoring end-tidal carbon dioxide levels is optimal as this has a knock-on effect on the pH of blood and cerebrospinal fluid (CSF). Hypercapnia causes acidosis with decreased pH of blood and CSF, leading to vasodilation of cerebral vessels, increased ICP and hypoxaemia. Hypocapnia causes alkalosis with increased pH of blood and CSF, cerebral vasoconstriction and cerebral ischaemia. The goal under anaesthesia is to maintain eucapnia or slight hypocapnia.

Oxygenation and ventilation must be monitored and maintained as altered levels of oxygen and carbon dioxide in arterial blood affect cerebral blood flow and ICP. Blood pressure should also be monitored and a mean arterial pressure of over 70–80 mmHg should be the aim. Assessment of the electrocardiogram (ECG) allows observation of waves and complexes, changes in which can indicate imminent crisis. Monitoring heart rate, respiratory rate and temperature are all important. The temperature may be high or low. Heart rate, respiratory rate and blood pressure are used to identify the Cushing reflex, which comprises bradycardia, hypertension and abnormal respiration. When all three components are present, this is called the Cushing triad. The Cushing reflex indicates rising ICP and is a life-threatening condition.

Early extubation prevents gagging, although constant monitoring is essential. A calm, stress-free recovery is desirable. Supplemental oxygen may be necessary and attention must be paid to positioning the recovering patient. Cardiovascular and respiratory functions must be supported as necessary at all times during the perioperative period, to try and keep the anaesthetized head trauma patient safe.

## KEY LEARNING OBJECTIVES

- To understand basic neuroanatomy and neurophysiology
- To understand the goals of anaesthesia for patients with head injury
- To be able to monitor an anaesthetized head trauma patient

## MULTIPLE CHOICE QUESTIONS

1. What does the Cushing triad, which indicates rising intracranial pressure, comprise?  
(A) Bradycardia, hypertension and abnormal respiration  
(B) Bradycardia, hypotension and hyperventilation  
(C) Tachycardia, hypertension and tachypnoea  
(D) Tachycardia, hypotension and bradypnoea
2. To which angle should head be elevated in a patient with known or suspected brain injury to preserve venous drainage from the head?  
(A) 5–10 degrees  
(B) 10–15 degrees  
(C) 15–30 degrees  
(D) 30–40 degrees

# (VN) Anaesthesia

3. What should be done to avoid a rise in intracranial pressure in an anaesthetized patient with head trauma?
- (A) Nitrous oxide should be used in the fresh gas flow

- (B) The concentration of inhalant agent should be kept low
- (C) Intravenous fluid administration should be withheld during anaesthesia
- (D) A small endotracheal tube should be placed to ensure successful intubation

## Anaesthesia of the RTA cat

Claire Woolford

On arrival at the clinic, an initial examination must be quickly completed. Is the **A**irway patent? Is the cat able to **B**reathe without showing signs of hypoxaemia? and is the **C**irculation effective – what is the blood pressure (BP), heart rate (HR), pulse quality, mucous membrane (MM) colour & capillary refill time (CRT)?

Following this initial survey, the patient should be provided with oxygen (mask or flow-by). Intravenous access must be quickly gained and fluid therapy started. Crystalloid fluids can be given as a bolus and the HR, pulse quality etc. assessed to determine if a repeat bolus is required.

Blood should be taken for baseline parameters: packed cell volume (PCV), total protein (TP), lactate, electrolytes. Be aware that if the patient has lost blood, the PCV may not fall for several hours (up to 24 hours).

Radiographs should be taken of chest/abdomen, and a focused assessment with sonography for trauma (FAST) of the abdomen can be performed if possible to rule out pneumothorax, effusions, herniation of organs and pulmonary contusions (after 24 hours).

After initial stabilization, the priority must be analgesia. Inadequately treated pain increases the stress response which will increase morbidity. Following severe trauma there is significant tissue damage and activation of inflammatory pathways. This will activate pain pathways, NMDA receptors will cause 'wind up' or sensitization to pain. Chronic pain is likely to develop which can last a lifetime.

Once stabilized, the patient may require anaesthesia for surgery to treat injuries, e.g. diaphragmatic hernia. Always preoxygenate prior to anaesthesia, use a safety checklist to ensure you have all the equipment required, the team is aware of the likely complications of the procedure and what interventions can be taken to correct or prevent them. Choose short-acting and reversible drugs, start at a fraction of the published doses and titrate to effect. Most anaesthetic drugs cause *dose-dependent* cardiovascular depression which can be catastrophic in patient with a low cardiovascular reserve.

Use all the monitoring methods you have available; blood pressure monitoring is essential during anaesthesia. Capnography, pulse oximetry, electrocardiogram (ECG)

and temperature monitoring should be used if possible to gain the most information about the status of the patient.

Intraoperative analgesia can be provided with methadone which can be topped up if required. Ketamine constant rate infusion (CRI) plus fentanyl or dexmedetomidine CRI will provide excellent analgesia which can be continued into the postoperative period. Local analgesic techniques, such as epidurals, dental blocks (for fractured jaws) or an incisional block should be used if possible. Avoid non-steroidal anti-inflammatory drugs (NSAIDs) in patients with hypovolaemia and anaemia. They are best used in the postoperative period when the patient is stable.

Continue to monitor the patient closely in the post-anaesthetic period. Assess the patient's blood pressure, pain, HR, respiratory rate and temperature every 15–30 minutes for the first 3–4 hours or until they are stable. Reassess PCV/TP, electrolytes and lactate.

### KEY LEARNING OBJECTIVES

- Understand the importance of preanaesthetic stabilization
- Understand the importance of analgesia
- Be able to choose the correct anaesthetic protocol for the patient

### MULTIPLE CHOICE QUESTIONS

1. Following haemorrhage, how quickly does the PCV change?  
(A) Within minutes  
(B) Within hours  
(C) Within days  
(D) Within weeks
2. Preanaesthetic stabilization is vital to prevent which of the following?  
(A) Peri-anaesthetic decompensation  
(B) Further haemorrhage  
(C) Arrhythmias  
(D) Hypertension
3. Multi-modal analgesia is vital to prevent which of the following?  
(A) Chronic pain development  
(B) Hypoalgesia  
(C) Hypoventilation  
(D) Hypothermia

# Anaesthesia of the brachycephalic patient

**Denise Prisk**

Brachycephalic dog breeds present the anaesthetist with several challenges. Many brachycephalic dogs have some degree of brachycephalic obstructive airway syndrome (BOAS). This comprises a group of anatomical variations which lead to upper airway obstruction. This is made worse if the patient is obese. In addition, BOAS is associated with gastrointestinal problems.

Brachycephalic breeds have a high resting vagal tone, which results in a slow heart rate. Furthermore, these breeds are often hyperthermic, due to the degree of work involved in normal respiration. The anaesthetized and sedated patient cannot compensate in the same way that the conscious animal does and this is why unfortunate events may occur. Many issues stated here also apply to some brachycephalic cat breeds. These cats have a short, flat head and can suffer from various grades of dyspnoea, depending on the length and breadth of the skull. Special consideration should be paid to the lubrication of their eyes, as tear drainage is impaired due to abnormalities of the nasolacrimal duct.

If the patient will allow, pulse oximetry can be assessed in the preanaesthetic period by clipping the sensor to the lip of amenable dogs (or reflectance oximetry used in the rectum). This will give an idea of oxygen saturation before induction. In order to prevent or delay desaturation, preoxygenation is necessary. Desaturation is more likely to occur in brachycephalic breeds as intubation may prove difficult. The administration of oxygen before inducing anaesthesia maximizes the oxygenation of tissues and helps prevent hypoxaemia. If possible, flow-by oxygen should be given throughout the induction process.

The periods of highest risk are from premedication until the trachea has been intubated, then after extubation until full recovery. As much monitoring as possible before induction will be helpful, for example, attaching the electrocardiogram (ECG) cables and blood pressure cuff. Any abnormalities, such as cardiac arrhythmias, may then be detected.

The head should be supported until the trachea has been intubated and the tube cuff filled with air, if necessary. Brachycephalic dog breeds often have large, heavy heads and if the head and neck are not supported, the airway can become compromised. In addition, regurgitation and aspiration may occur. Gentle intubation must be observed, as irritation of the pharyngeal structures can lead to post-extubation problems. If several attempts at intubation are needed, giving oxygen via a tight-fitting mask in between attempts will help prevent or treat hypoxaemia.

These patients often do not ventilate well under anaesthesia and capnography is a very useful tool for assessing ventilation. Ventilation is furthermore compromised if

the patient is positioned in dorsal recumbency and it may be necessary to ventilate artificially, either manually, with a suitable breathing system, or mechanically, with a ventilator.

Extubation of brachycephalic breeds is generally performed as late as is safely possible. Supplemental oxygen should be provided and recovery in an oxygen-enriched environment is ideal, such as placing small patients in an incubator or oxygen cage. Care must be taken to ensure overheating does not occur, as the temperature in oxygen cages can rise and cause hyperthermia. Recovery in sternal recumbency optimizes oxygenation of both lungs. It may be necessary to prop the patient up so it maintains this position. Pain leads to panting, which can lead to obstruction. Postoperative analgesia is therefore very important, as are close monitoring and pain assessment or scoring. Ideally, recovery will take place in a quiet and calm environment, to minimize stress.

## KEY LEARNING OBJECTIVES

- To understand the specific challenges that exist when anaesthetizing a brachycephalic breed
- To be able to prepare for anaesthesia of a brachycephalic dog
- To optimize perianaesthetic nursing care for brachycephalic animals

## MULTIPLE CHOICE QUESTIONS

1. Brachycephalic dog breeds have which of the following?
  - (A) High resting vagal tone, resulting in a slow heart rate
  - (B) Low resting vagal tone, resulting in a slow heart rate
  - (C) High resting vagal tone, resulting in a high heart rate
  - (D) Low vagal tone, resulting in a high heart rate
2. What are three anatomical variations that form brachycephalic obstructive airway syndrome?
  - (A) Short soft palate, pharyngeal hyperplasia, widened nares
  - (B) Pharyngeal hypoplasia, large tongue, hyperplastic trachea
  - (C) Inversion of the laryngeal sacculles, hyperplastic trachea, stenotic nares
  - (D) Eversion of the laryngeal sacculles, long soft palate, hypoplastic trachea
3. What is a particular concern during anaesthesia of a Persian cat?
  - (A) Hyperthermia due to panting
  - (B) Difficult intubation due to overlarge tongue
  - (C) Corneal drying due to abnormality of the nasolacrimal duct
  - (D) Inability to fully open the mouth, making assessment of jaw tone difficult

# (VN) Anaesthesia

## Anaesthesia for the young and old

Emma Archer

There are several anatomical, physiological, equipment and pharmacological considerations for the young and old compared to adult patients.

### PAEDIATRIC PHYSIOLOGY

#### Cardiovascular physiology

Cardiac output (and blood pressure) is largely heart-rate dependent in paediatric patients. They have less functional contractile cardiac muscle and low ventricular compliance compared to adults. Furthermore, they also have an underdeveloped sympathetic nervous system, have reduced baroreceptor reflexes and are less able to vasoconstrict/vasodilate when required. This means that bradycardia in paediatric patients may profoundly affect cardiac output and blood pressure.

#### Respiratory physiology

A relatively larger tongue with a narrower upper airway means upper respiratory tract obstruction is of greater risk in the absence of intubation. A smaller functional residual capacity means hypoxia is more likely at induction of anaesthesia or in times of apnoea. Pulmonary reserve is limited, oxygen consumption is two to three times higher than adults due to their increased metabolic rate. This increase in oxygen consumption is met by an increased respiratory rate and the respiratory pattern is sinusoidal with little or no end-expiratory pause. Lung and chest wall compliance is high and hypoventilation and respiratory muscle fatigue are common under anaesthesia, especially in the presence of respiratory depressive anaesthetic agents.

#### Hepatic physiology

The hepatic system is underdeveloped in paediatric patients. The enzyme systems responsible for metabolism and biotransformation of many anaesthetic drugs are not fully functional until at least 8 weeks of age, leading to prolonged drug metabolism and recovery. Where possible, drugs metabolized extensively by the liver should be avoided and, if not possible, doses reduced and longer recovery times executed. Due to minimal glycogen storage, excessive preanaesthesia starvation can cause hypoglycaemia. Avoid excessive fasting, monitoring of blood glucose should occur and glucose-containing intravenous fluids may be required.

#### Renal physiology

Plasma albumin levels are lower until about 8 weeks of age thus highly protein-bound drugs like propofol will exert a greater initial effect due to the greater proportion of free drug in circulation (less albumin available to

bind to). Total fluid volume and extracellular fluid volume are higher than in adults and there is a greater tendency to dehydrate with smaller fluid losses. Renal function is reduced in the first 6–8 weeks of life and paediatric patients cannot tolerate large volumes of rapidly administered fluids. Fluids should be administered via a burette or fluid pump.

#### Temperature control

Paediatric patients are extremely prone to hypothermia due to low fat reserves, a high surface-area-to-volume ratio and poor thermoregulation.

### GERIATRIC PHYSIOLOGY

There is no clear definition of 'geriatric' in relation to cats and dogs however it is generally used when an animal has reached 75–80% of its anticipated life expectancy.

#### Cardiovascular physiology

Geriatrics have decreased blood volume and baroreceptor reflex with reduced cardiac output, increased vagal tone and circulation time. Furthermore, they may also be predisposed to arrhythmias and have underlying degenerative or progressive cardiac disease, such as mitral valve disease or dilated cardiomyopathy.

#### Respiratory physiology

Pulmonary changes lead to decreased lung elasticity, respiratory rate, tidal volume and oxygen-diffusion capacity. There is decreased respiratory muscle strength and chest wall compliance.

#### Hepatic physiology

In geriatrics there is decreased functional liver mass, a decrease in hepatic blood flow due to reduced cardiac output and decreased metabolic activity.

#### Renal physiology

There is a reduced renal blood flow due to reduced cardiac output, decreased glomerular filtration rate and a loss of functional nephrons in conjunction with a decreased ability to concentrate urine and secrete hydrogens.

#### Central nervous system

Geriatric patients may have altered cognition and motor function. Neuronal degeneration means a reduction in brain mass and decreased thermoregulatory centre function may lead to hypothermia.

#### Summary

Geriatrics have a reduced ability to compensate for cardiovascular and respiratory depression caused by anaesthetic drugs and are less able to tolerate haemorrhage or hypovolaemia. The implications of this will be discussed in detail in the lecture.

## KEY LEARNING OBJECTIVES

- To identify the main anatomical and physiological differences for paediatrics and geriatrics (compared to adults)
- To understand how these affect our anaesthetic drug protocol and our anaesthetic equipment choices and our non-pharmacological approaches to anaesthesia
- To gain hints and tips you can practically apply to your daily working practices

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is incorrect when considering cardiovascular physiology?
  - (A) Paediatrics have a reduced baroreceptor reflex
  - (B) Paediatrics have increased sympathetic tone
  - (C) Paediatrics have reduced functional cardiac contractile tissue
  - (D) Paediatrics have an underdeveloped sympathetic nervous system
2. Which equipment consideration is INCORRECT for paediatrics?
  - (A) Their small tidal volume may mean the equipment dead space is significant
  - (B) Resistance to breathing will be relatively increased
  - (C) A large surface-area-to-volume ratio means hypothermia is likely
  - (D) All of the above
3. Which of the following are important considerations for geriatric anaesthesia?
  - (A) Reduced ability to compensate for the respiratory and cardiovascular depressive effects of anaesthetic drugs
  - (B) A reduction in functioning nephrons
  - (C) An increased likelihood of joint disease means patient positioning and analgesia are important
  - (D) All of the above

# Anaesthesia of the acute abdomen

Claire Woolford

The acute abdomen is any abdominal disease process that has a sudden onset of severe pain, e.g. septic peritonitis, intestinal foreign body or gastric dilatation–volvulus.

Take the time to get a full history. Baseline parameters and full clinical examination should be completed. Temperature, pulse, respiration (TPR), pulse quality/rhythm, mucous membrane (MM) colour, capillary refill time (CRT). Check packed cell volume/total solids (PCV/TS), glucose, lactate, biochemistry and haematology. Blood gases give information on acid–base status.

Patients will often present in shock. This occurs due to poor tissue perfusion, blood flow is low and unevenly distributed. Oxygen delivery to tissues is impaired. In early shock the body compensates through peripheral vasoconstriction to promote flow to major organs. Pale MM's, prolonged CRT, poor peripheral pulses, cold extremities and dull mentation are seen.

Anaesthesia dulls the compensatory mechanisms and can push patients into a rapid decompensation. Gaining intravenous access is a priority. Choose large-bore cannulas and consider placing two!

Start fluids with a balanced crystalloid solution. Goal-directed fluid therapy should be used. Patients in shock should not be automatically given 90 ml/kg/h. The goals are to restore circulating volume, improve oxygen delivery and improve tachycardia. Give a 10 ml/kg bolus then recheck HR, blood pressure (BP), MM colour and CRT. Repeat the bolus if required. When improvement in

vitals is seen, reduce rate to 2–4 ml/kg/h and monitor closely. Correct electrolytes prior to anaesthesia.

Analgesia is extremely important for these patients. Pain makes patients more prone to complications, e.g. arrhythmias, it increases stress and morbidity. Start with opioids like methadone 0.2–0.3 mg/kg slowly i.v. and repeat if required. Fentanyl continuous rate infusion (CRI) will provide excellent analgesia. Lidocaine is very useful in abdominal pain, it provides analgesia, prevents ileus, and may help with reperfusion injury. It can be given as a CRI alongside opioids. Non-steroidal anti-inflammatory drugs (NSAIDs) are contraindicated for patients in shock, hypotension and with gastrointestinal disease. Consider local anaesthetic techniques, e.g. incisional blocks, epidurals.

Use a safety checklist to ensure you have everything ready and that everyone understands the possible complications. <https://ava.eu.com/resources/checklists/>

Give anaesthetic drugs slowly and only to effect, consider a co-induction technique, e.g. propofol/midazolam.

Hypotension should be treated rapidly. Reduce inhalation anaesthetics and ensure good analgesia. Fluid boluses can be given. If hypotension persists then drugs, e.g. dopamine or noradrenaline, may be required. Arrhythmias are common and require treatment if they affect BP. Pulse pressure variation (PPV) monitors fluid responsiveness under anaesthesia. Using the pulse waveform, look for 'dips' in the waveform during inspiration which show the vena cava is collapsing under pressure of inspiration indicating hypovolaemia. This is seen before changes HR and BP. An improvement will be seen if the fluid bolus is successful, if not then consider drug therapy to improve BP.

Do not stop monitoring in recovery, continue checking TPR, BP, MM colour, CRT and, most importantly, pain regularly. Provide oxygen supplementation if required and consider placing a urinary catheter. Do not forget a comfortable bed and TLC.



# (VN) Anaesthesia

## KEY LEARNING OBJECTIVES

- Understand how to stabilize a critical patient for anaesthesia
- Learn best practice for fluid therapy in the acute abdomen patient
- Learn the best analgesia options for critical patients

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is true about oxygen delivery to the tissues in hypovolaemic shock?  
(A) Impaired  
(B) Increased

- (C) Unchanged
  - (D) Diverted peripherally
2. What may insufficient analgesia result in?  
(A) Increased morbidity  
(B) Improved demeanour  
(C) Decreased respiratory rate  
(D) Improved patient stabilization
  3. Which of the following drugs are contraindicated in hypovolaemia?  
(A) NSAIDs  
(B) Opioids  
(C) Antibiotics  
(D) Lidocaine

# Central lines

## Claire Woolford

Central venous catheters are useful in critical patients that require multiple infusions or infusions of incompatible fluids. They can also be used for patients that need regular blood sampling such as diabetic patients requiring serial blood glucose samples.

Central lines are contraindicated in patients that have coagulopathies, risk of thrombosis and skin infection at the intended site.

Most central lines are placed with a guide wire using the Seldinger technique. These tend to come in commercially prepared kits and are available in sizes 4–7 Fr single, double or triple lumens.

Anaesthesia is required. Aseptic technique is absolutely vital; most infections are due to poor asepsis during placement. A wide clip is required to prevent contamination of the site and allow it to be easily inspected.

## THE SELDINGER TECHNIQUE

1. Place the patient in lateral recumbency with a sandbag under the neck to raise it and make the jugular easier to see
2. Clip the area and aseptically prepare with chlorhexidine and isopropyl alcohol
3. Surgically scrub hands and put sterile gloves on
4. Drape the patient in a sterile manner with a large drape
5. Prepare the catheter by flushing all the lumens with sterile saline and closing the gate clamps
6. Ask an assistant to raise the vein so you can identify its position
7. Over the vein, tent and lift the skin, perform a small stab incision using a No. 11 blade. Be sure to go through all the layers of the skin
8. Insert the introductory needle (or large-bore intravenous catheter) through the incision and into the vein
9. Place swab under the needle to catch blood
10. Feed the guide wire through the needle, watch the patient's electrocardiogram (ECG) for arrhythmias

which may occur if the guide wire enters the heart. If you see an arrhythmia then stop and withdraw the wire a short way. Once the wire is inserted you should maintain a hold on the wire to prevent it being pushed into the patient and becoming lost

11. Over the wire withdraw your needle, place a sterile swab over the insertion site if there is bleeding
12. Over the guide wire feed the dilator into the vein, use a twisting and pushing technique to insert the dilator and make a sufficiently large hole in the jugular for the catheter
13. Withdraw the dilator over the wire, again place a swab over the site as it is likely to bleed
14. Over the wire insert the catheter, feed the guide wire out of the patient until it appears through the port (likely brown port). *Hold on to the wire* and feed the catheter into the patient
15. Monitor the ECG for arrhythmias and withdraw the catheter a little if they are seen
16. Close the gate as you take the wire out of the catheter to prevent air embolism
17. Using sterile saline, aspirate blood and flush each port with saline to ensure they are patent
18. Suture the catheter in place
19. Dress with sterile swabs and a neck bandage

## KEY LEARNING OBJECTIVES

- Understand the Seldinger technique for placing central lines
- Understand the contraindications of central line placement
- Understand the indications for placement of a central line

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is a contraindication of central line placement?  
(A) Risk of thrombosis  
(B) Cardiac disease  
(C) Brachycephalic breed  
(D) Risk of fluid overload



2. Which of the following would be a suitable patient for central placement?

(A) Diabetic cat  
(B) Dog with von Willebrand's disease  
(C) Patient with skin infection  
(D) Patient with hypercoagulopathy

3. As the guide wire is removed, what must be done?

(A) Close the gate clamp  
(B) Open all the ports  
(C) Open only the brown port  
(D) Close only the blue port

## Arterial lines

**Claire Woolford**

Arterial catheterization can be a very important technique for monitoring critical patients. Any patient that requires continuous blood pressure (BP) monitoring or repeated blood gas sampling will benefit from an arterial catheter. Contraindications are: haemostatic abnormalities, hypercoagulable states (risk of thrombosis) or pyoderma at insertion site.

There is a variety of arteries that are suitable for catheterization; dorsal pedal artery, auricular artery, coccygeal artery, radial artery and even the lingual artery. The most commonly used is the dorsal pedal artery which runs dorsomedially across the metatarsal bones. Arterial line placement can be more painful than venous catheters therefore heavy sedation or anaesthesia is required, local anaesthesia can be used in patients that are unsuitable for anaesthesia.

Aseptic technique is very important, critical patients are more susceptible to hospital-acquired infections. Washing your hands is the best way to prevent passing infection to your patient. Clip a wide area of hair around the intended site again to prevent infection but also so that the insertion site is visible making problems easier to spot.

For placing an arterial catheter you will need; chlorhexidine, swabs, no. 11 surgical scalpel, intravenous catheter (24–20 g), zinc oxide tape, t-connector or injection cap.

1. Place patient in lateral recumbency with the leg being catheterized lowermost
2. Clip and gently prepare the area with chlorhexidine. Do not 'scrub' the area because arteries are very sensitive and may go into spasm
3. Wash your hands
4. Palpate the artery. It can be useful to use two fingers for this to give an idea of the direction the artery
5. You may want to use the scalpel blade to make a very small 'nick' in the skin to help the catheter pass smoothly
6. While palpating the artery insert the catheter directly over where the pulse is felt. Hold the catheter as you would hold a pen at a roughly 15-degree angle
7. Arteries are hard walled compared to veins and a degree of confidence is required when inserting the catheter or the artery will bounce away from it
8. When a flash of blood is seen in the hub of the catheter advance the catheter off the stylet into the artery

9. Once the stylet is removed quickly attach your connector
10. Use a dry swab to clean away excess blood. Apply zinc oxide tape under the catheter around the leg and back over the catheter. Apply the tape fairly tightly as the patient's blood pressure may push the catheter out
11. Use more strips of tape to further secure the catheter and connector
12. Flush the catheter with heparinized saline

The arterial catheter must not have anything other than saline injected into it. Clearly label the catheter as 'Arterial' to prevent it being mistaken for an intravenous catheter. Flush the catheter regularly to maintain patency. When not in use ensure the catheter is not able to become dislodged and any gates are closed to prevent haemorrhage.

*Top tip:* arterial catheterization can take time to learn – don't give up!

### KEY LEARNING OBJECTIVES

- Choose a suitable arterial catheterization site
- Understand the procedure for placing an arterial catheter
- Understand the contraindications and risks of arterial lines

### MULTIPLE CHOICE QUESTIONS

1. What is the most common site for arterial catheterization?  
(A) Dorsal pedal artery  
(B) Carotid artery  
(C) Brachial artery  
(D) Radial artery
2. Which of the following is a contraindication to arterial catheterization?  
(A) Heart disease  
(B) Coagulopathy  
(C) Metabolic acidosis  
(D) Hypovolaemia
3. Which of the following can be administered via an arterial line?  
(A) Heparinized saline  
(B) Colloids  
(C) Opioids  
(D) Anaesthetic drugs

# Anaesthesia and analgesia of patients with complex medical conditions

Emma Archer

Anaesthetizing patients with complex medical conditions can present a challenge to even the most experienced nurse. Careful planning will prevent many complications from arising and good communication with the veterinary surgeon will save valuable minutes in the event of a crisis. Many medically ill patients will need analgesia, general anaesthesia or sedation during their stay in hospital. Anaesthesia may be required for many reasons, whether therapeutic or diagnostic, and can present a challenge to even the most experienced nurse who is expected to safely monitor and recover these patients. Contrary to popular belief, in critically ill patients sedation is NOT safer than general anaesthesia. Generally with critical patients, general anaesthesia allows establishment of a protected airway by endotracheal intubation, allowing administration of 100% oxygen and provides provision of intermittent positive pressure ventilation and often more thorough monitoring.

There are many groups of patient that may be classified as having complex medical conditions which will be challenging to anaesthetize, including respiratory disease, heart disease, liver or kidney disease, sepsis, intracranial disease, diabetes mellitus and anaemia. These will be discussed in this lecture.

Patients with complex medical conditions often present with hypoalbuminaemia and electrolyte and acid–base disturbances, hypovolaemia and polyuria and polydipsia. Compensatory mechanisms present in ‘sick’ patients act to maintain circulation to essential organs, thus a patient may appear relatively cardiovascularly stable; nonetheless, they may in fact be ‘teetering on the edge’ using all their reserves to compensate for the disease processes. Because almost all anaesthetic agents cause dose-dependent cardiovascular and respiratory depression, the patient may be more susceptible to these adverse effects as they are unable to mount additional compensatory mechanisms to counteract them. Therefore, it is vital to identify and treat as many derangements as possible prior to anaesthesia.

It is worth remembering that very few situations require anaesthesia immediately and most procedures can be delayed to allow proper and effective patient stabilization. Hypovolaemia, electrolyte imbalances and arrhythmias should be corrected prior to induction of anaesthesia. Many will require fluid therapy prior to induction of anaesthesia to correct hypovolaemic shock, dehydration, electrolyte imbalances, acid–base disturbances and anaemia.

‘There are no safe drugs, only safe anaesthetists.’ It is how we use the drug that makes them safe. Small doses titrated to effect through an intravenous catheter is important, preoxygenate and keep the patient calm.

Consideration of patient positioning and analgesia is important too.

In patients with complex medical conditions, appropriate monitoring equipment in conjunction with assessment of patient parameters, such as peripheral pulse quality and mucous membrane colour, is crucial to anticipate and treat complications before they become serious. An important principle is to monitor all the vital signs you can and combine the information to build up a picture of what is happening to the patient.

The recovery period (especially the initial 3 hours) is the most critical time for many of these patients. Appropriate monitoring should continue, with particular attention to airway maintenance, body temperature and peripheral pulse rate and quality. Warming devices are usually required and facilities for oxygen supplementation should be available.

## KEY LEARNING OBJECTIVES

- To understand the importance of stabilization of patients with complex medical conditions
- To understand how to stabilize these patients
- To understand how to effectively monitor and recover these patients

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is true for patients with complex medical conditions?
  - (A) Should have their medical condition cured before anaesthesia
  - (B) Where possible, consequences of their medical condition, such as electrolyte abnormalities, should be corrected prior to anaesthesia
  - (C) Should only be anaesthetized in a life-threatening emergency
  - (D) Should be sedated rather than have a general anaesthetic
2. Why do patients with unstable medical conditions require special consideration prior to anaesthesia?
  - (A) They may already be using all their compensatory mechanisms to deal with the disease process, so cannot cope with the cardiovascular and respiratory depressive effects of anaesthesia
  - (B) They may have electrolyte or acid–base abnormalities
  - (C) They may have arrhythmias
  - (D) All of the above
3. Which of the following is correct when considering the recovery period?
  - (A) The recovery period is the most risky time of the peri-anaesthetic period
  - (B) The recovery period does not require close monitoring
  - (C) Hypothermia is less likely in the recovery period
  - (D) Oxygen supplementation will not be required in recovery

## Section IV

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# Veterinary nursing streams

Sunday 7 April

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Sunday 7 April  
Hall 9

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## (VN) Exotics

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- 266 09:20–10:05  
**Help: rabbit anaesthetic**  
Jo Hinde
- 267 10:40–11:25  
**Preventative medicine for rabbits**  
Jo Hinde
- 268 11:35–12:20  
**Rabbit obesity clinics**  
Jo Hinde
- 269 13:35–14:20  
**Nursing ileus**  
Jo Hinde
- 270 14:30–15:15  
**Is it all about hay and grass: rabbit nutrition**  
Nicola Ackerman
- 270 15:20–16:05  
**Exotic pet welfare and ethics**  
Shakira Free-Miles

# Help: rabbit anaesthetic

Jo Hinde

Rabbit anaesthetics have a bad reputation for being difficult, stressful and going wrong, however this doesn't have to be the case. Rabbit mortality rates are significantly higher than in cats and dogs, however, this can be reduced by improving standards within your team.

Taking the holistic approach means your patient is in the best possible condition for the procedure. Postponing non-urgent cases whilst pre-existing disease or husbandry deficits are improved is recommended.

On the day, keep stress and pain to a minimum (use local anaesthetic (EMLA) prior to intravenous catheterization, minimize the use of intramuscular injections) and ensure adequate analgesia is used pre-, peri- and post-operatively. Consider a multimodal approach, including opioids, non-steroidal anti-inflammatory drugs (NSAIDs), local anaesthetics, surgical techniques to cause less tissue trauma and distraction analgesia to reduce the impact of pain in the recovery period.

Have a good understanding of rabbit respiratory anatomy and try, whenever possible, to position them in sternal recumbancy, or with the thorax slightly elevated above the abdomen to reduce the pressure on the diaphragm.

## AIRWAY OPTIONS

There is no 'gold standard' way, however it is vital that a patent airway is secured and constantly monitored. There are three main options:

- Small, well fitting face mask
- Endotracheal tube (ETT)
- Supraglottic airway device (v-gel)

Each has pros and cons and all can be used with the correct monitoring. It is recommended that rabbits receive supplemental ventilation so the option you choose should allow this.

Always:

- Check and flush the mouth
- Ensure the rabbit is at a surgical plane of anaesthesia before intubating
- Preoxygenate
- Use lidocaine spray and lubricate ETTs/v-gels
- Use a new single-use Portex ETT (2.5–3 mm uncuffed) to reduce contamination and damage to the trachea

## MONITORING

It is vital that all rabbits are continually monitored and results recorded, from the time of premedication through to recovery. Frequency can be reduced once the patient

is standing, but checks should continue until the rabbit is eating and passing faeces.

There is no substitute for a qualified veterinary nurse, but there are things that the nurse cannot measure without a machine to help. These machines include:

- Pulse oximeter
- Blood pressure Doppler
- Capnograph

Capnography is the most important of these as there is no other way to assess the patient's CO<sub>2</sub> levels. Many rabbits are hypercapnic as soon as the anaesthetic starts. Understand the importance of the 'trend', how to identify and compensate for hypocapnia and hypercapnia and the after-effects this can have on the patient's recovery.

## RECOVERY

This is often the most dangerous part and it is vital that the patient is monitored closely. Oxygenate the rabbit after finishing the operation, ensuring the end-tidal carbon dioxide (ETCO<sub>2</sub>) is within the normal range. Continue temperature, pulse and respiration (TPR) checks until the rabbit is standing, then offer a measured amount of food and water. If the patient has not eaten within 1 hour of walking, then check the analgesia levels are adequate and syringe feed 10–15 ml/kg. Only discharge the patient after they are eating well and passing faeces and give at least 3 days' of pain relief (usually meloxicam).

## KEY LEARNING OBJECTIVES

- Understand the importance of the holistic approach
- Explore the monitoring options available
- Learn how to create rabbit-specific protocols

## MULTIPLE CHOICE QUESTIONS

1. What is the normal ETCO<sub>2</sub> range for rabbits?  
(A) 22–35 mmHg  
(B) 32–45 mmHg  
(C) 42–55 mmHg  
(D) 52–65 mmHg
2. What is the best positioning for rabbits?  
(A) Lateral  
(B) Dorsal  
(C) Sternal  
(D) Caudal
3. Where is the best place to site an intravenous cannula?  
(A) Marginal ear vein  
(B) Auricular artery  
(C) Jugular vein  
(D) Cephalic artery

# Preventative medicine for rabbits

Jo Hinde

Rabbits are the UK's third most popular pet and have an average lifespan of 7–10 years. As such, we should be ensuring we understand their specific healthcare needs and offer appropriate preventative treatments.

A good-quality, balanced diet, along with the correct enclosure, really is the key to preventative rabbit care. Feed adults an 80% hay diet with just a couple of tablespoons of good quality, extruded commercial pellets. Do not feed multi-component mixes as these have been shown to increase selective feeding, and dietary and digestive problems. A small handful of fresh greens can be fed per day. Avoid fruit and sweet or starchy treats.

Rabbit's enclosures need to meet the RWA's minimum guidelines of 10 ft x 6 ft. This should comprise of a living and exercise space permanently attached. It is vital rabbits have room to exhibit their natural behaviour of grazing and exploring both horizontally and vertically. If the enclosure is too small it can cause skeletal problems as well as behavioural ones. It also increases the risk of digestive or urinary problems, as well as increasing the risk of myiasis.

Myiasis is a common problem that can be prevented in most cases. Correct diet and husbandry are vital and it is recommended to use a preventative product, such as Rearguard or F10 Wound Spray.

Infectious diseases such as myxomatosis and rabbit viral haemorrhagic disease (RVHD) are spread throughout the UK and are a risk to both indoor and outdoor rabbits. Vaccinations are available and should be recommended to all clients along with environmental and biosecurity advice. Make sure your clients understand biosecurity including quarantine, cleaning vs disinfection and barrier nursing.

Neutering is an important part of preventative healthcare, especially for females who have an 80% risk of developing uterine cancer before they are 5 years of age. As rabbits are social creatures that should ideally live in opposite sex pairs, neutering is also needed to prevent unplanned litters and unwanted behaviours.

*Encephalitozoon cuniculi* (EC) is a complex subject. There are no real preventatives against this and it is commonly found in over half of the domestic UK rabbits

tested. It is often misdiagnosed and treatment started before any tests have been done. It is advised to be cautious about treating this condition and explore all possible differentials, as a seropositive EC result may not be the reason for the current clinical signs.

Routine worming is not recommended for domestic rabbits as they rarely have any pathogenic worms. Fenbendazole should be used with caution as it is not a benign molecule and can cause anaemia.

Gastrointestinal stasis is a symptom and not a cause. It is important to highlight the signs to owners and find the underlying trigger. Corrections to the diet can help reduce the frequency of some cases.

Providing good levels of owner education and support are vital and this can be done in a variety of ways, including nurse clinics, posters, handouts and social media pages. Prevention really is better than cure.

## KEY LEARNING OBJECTIVES

- Understand the main diseases and conditions that can be prevented
- Know the range of preventatives available and when to use each one
- Update and create practice protocols including educational displays and nurse clinics

## MULTIPLE CHOICE QUESTIONS

1. What is the scientific name for flystrike?
  - (A) Mydriasis
  - (B) Myiasis
  - (C) Mitosis
  - (D) Miosis
2. Which diseases should domestic rabbits be vaccinated against?
  - (A) Myxomatosis
  - (B) RHD1
  - (C) RHD2
  - (D) All of the above
3. What percentage of entire female rabbits have been shown to develop uterine cancer?
  - (A) 60%
  - (B) 70%
  - (C) 80%
  - (D) 90%

# Rabbit obesity clinics

## Jo Hinde

Obesity is a growing concern and a high proportion of rabbits seen within clinic are overweight.

### HUSBANDRY

Correct husbandry is vital to owning a healthy rabbit. The diet should be of high quality and suitable for the individual's life stage.

- Junior: up to 6 months old. Feed mainly alfalfa hay and approximately 5 tablespoons of junior pellet food per day. Greens can be introduced around 4 months old
- Adult: 6 months to 4 years. Feed mainly timothy hay (alfalfa should just be an occasional treat). Feed approximately 1 tablespoon of adult pellets per kg of ideal bodyweight per day. Offer one small handful of safe greens (no bigger than the size of the rabbit's head) per day
- Mature: 4 years+. Feed as per adult but switch to mature pellets

Constant access to fresh water via a bowl must be provided for all life stages.

Housing also has a direct effect on the rabbit's weight. Enclosures that are too small mean the rabbit cannot move around adequately and can result in obesity, muscle wastage, ileus, urinary problems and pododermatitis, as well as behavioural issues. The Rabbit Welfare Association's current guidelines state that the minimum space requirement is 10 ft x 6 ft x 3 ft high.

### ASSESSING CONDITION

A thorough nose-to-tail check should be carried out at every visit:

- Vaccination status
- Respiratory rate, heart rate and demeanour
- Nose and eyes
- Ears
- Skin and fur
- Body and weight
- Genitals and tail
- Feet and nails
- Jaw and teeth
- History (taken throughout)

Body condition and muscle condition scoring are vital – teach the owner to carry these out at home on a weekly basis. When dealing with obesity it is important to look beyond the rabbit's weight for any underlying medical conditions that may be causing or exacerbating

the problem, such as arthritis, pododermatitis and dental disease.

### WEIGHT-MANAGEMENT CLINICS

This may be a tricky subject to broach with the owner so be tactful. Once they understand the reasons why obesity is a problem then they are more likely to comply with your recommended changes. Teach the owner what to monitor at home and then get them to report back to you weekly with updates via email. You can then get the owner to bring the rabbit to the clinic just once every 3–4 weeks to reduce the stress of the visits. Request photos in the standard body condition score poses as well as information on behaviour, exercise and diet. Make sure you give the client a targeted, clear action plan to follow that ensures a gradual increase in exercise and slow dietary modification to avoid complications.

Use enrichment techniques to prolong feeding activity and promote exercise. Hanging fresh greens up so the rabbit has to stand up tall and scattering feeding pellets are a couple of the options available.

Always remember that dietary modification will be needed throughout the rabbit's life depending on wellness and age.

### KEY LEARNING OBJECTIVES

- Understand the main causes and consequences of obesity and how these can be treated and prevented
- Know the recommended husbandry guidelines
- Understand how to set up and run weight-management clinics for rabbits

### MULTIPLE CHOICE QUESTIONS

1. What are the current RWA minimum housing guidelines?  
(A) 8 ft x 6 ft x 2 ft  
(B) 8 ft x 6 ft x 3 ft  
(C) 10 ft x 6 ft x 3 ft  
(D) 10 ft x 8 ft x 3 ft
2. Which problem can be associated with obesity?  
(A) Pododermatitis  
(B) Arthritis  
(C) Urinary sludge  
(D) All of the above
3. From what age is it recommended to feed mature pellets?  
(A) 4 years  
(B) 5 years  
(C) 6 years  
(D) 7 years



# Nursing ileus

## Jo Hinde

Ileus refers to slowing of the digestive tract. It is one of the most commonly presenting problems, however it is a symptom not a cause.

### PRESENTATION

Stasis is usually a direct result of pain and/or stress and this releases catecholamines as part of the flight or fight response. Almost all unwell rabbits will present with ileus, the symptoms of which include:

- Lethargy
- Hunching
- Tooth grinding
- Anorexia (or fussiness with food)
- Reduction/cessation of faecal pellets (or shape change)

This wide range of symptoms could point to a variety of differential diagnoses. It is important to check and monitor the patient's clinical parameters – many of these cases will be dehydrated. Assess the behavioural signs too and ensure you are pain scoring frequently.

### TREATMENT

Initial treatment options for stasis follow. It is, however, vital that the underlying condition(s) are also treated once the patient is stabilized.

- Start analgesia! This is the most important part of the treatment. Use a multimodal approach and keep the analgesia topped up
- Provide fluid therapy as needed (via intravenous canula initially and moving to oral as soon as stable enough). Doing this via slow bolus is recommended rather than using a giving set. Use caution when considering giving subcutaneous fluids as these may not be well absorbed if the patient is hypothermic/hypovolaemic
- Restore normothermia by warming/cooling as needed
- Consider the use of prokinetics but ONLY after ruling out an obstruction
- Start supportive feeding. Initially this will often be via syringe feeding a commercial liquid diet such as Recovery Plus or Critical Care. Standard amount is 10–15 ml/kg q6h, but this needs to be tailored to each patient. As they improve, you can switch to assisted feeding by offering fresh herbs or treats
- Ensure the rabbit has space to move around as this will naturally stimulate the gut. Always keep bonded partners together to reduce stress

- Check blood glucose frequently. This, combined with the other clinical parameters, can give a good indication of the stress and pain levels of the rabbit and can be a useful tool to identify possible obstruction. Rabbits with a blood glucose result of 15 mmol/l or higher should be admitted for supportive treatment and retested every 10–15 minutes to ensure the treatment is working (the blood glucose value should stabilize and drop). If the value is 20–25+ mmol/l, then this is an extremely unwell patient that needs intensive care

Diagnostic images can be helpful to rule out obstruction and look for the underlying causes of the ileus. However, it is important to stabilize the patient before anaesthesia. Conscious radiographs are rarely of any diagnostic value.

### DISCHARGE

The patient can be discharged once they have started eating and passing faeces. They must be sent home with analgesia and possibly prokinetics for a few days. Ensure you have taught the client how to administer all medications, including syringe feeding.

### KEY LEARNING OBJECTIVES

- Understand the main causes and consequences of ileus
- Know the basic treatment protocols
- Be able to identify, monitor and treat pain in rabbits

### MULTIPLE CHOICE QUESTIONS

1. What blood test is recommended for rabbits in stasis?
  - (A) Glucose
  - (B) Glucogen
  - (C) Globulin
  - (D) Glyceride
2. What are the current syringe feeding guidelines?
  - (A) 5–10 ml/kg q6h
  - (B) 5–10 ml/kg q12h
  - (C) 10–15 ml/kg q6h
  - (D) 10–15 ml/kg q12h
3. What is the recommended route for initial fluid therapy?
  - (A) Intravenous
  - (B) Orally
  - (C) Intraperitoneal
  - (D) Subcutaneous

# Is it all about hay and grass: rabbit nutrition

Nicola Ackerman

We all know that rabbits need to consume their own body size in grass and hay, on a daily basis, with limited amounts of concentrates (pellets) and fresh vegetables. However, not all grass and hays are the same. Many clients aren't aware that there are different types of grasses (and hence hays), many are not aware of the difference between hay and straw.

Alfalfa (lucerne) hay is often fed to rabbits as it has a very green colour and pleasant looks and smell to the rabbit owner. Alfalfa is part of the pea family and is not naturally found in Northern Europe and the UK. Alfalfa hay is high in protein, phosphorus and calcium; it is ideal for growing animals, especially horses, which is why it was initially used for commercially. It is not ideal for adult rabbits.

Timothy hay is produced from grass found in the UK. The fibre content is much higher than that of alfalfa hays, it has a low protein content and lower values of calcium and phosphate. Timothy hay doesn't look as appealing as alfalfa hay, but for rabbits it is nutritionally superior.

The type of vegetables that owners are feeding their rabbits is important. Ideally the same type and volume of vegetables should be fed daily. Vegetables have varying amounts of vitamins, minerals and carbohydrates. Some can be fairly high in phosphates, some in calcium and some in simple sugars. Knowledge of the different nutritional content of vegetables in order to educate rabbit owners is important.

## KEY LEARNING OBJECTIVES

- Different nutritional values for different types of hay
- What can/should we be recommending to clients to feed their rabbits
- What vegetables are best for rabbits and why

## MULTIPLE CHOICE QUESTIONS

1. Alfalfa hay has which nutritional characteristics in comparison to timothy hay?
  - (A) Lower protein, higher fibre, lower calcium
  - (B) Higher protein, higher calcium, higher phosphate
  - (C) Higher protein, lower calcium, lower fibre
  - (D) They are the same
2. Why do the brassica vegetables (kale, broccoli, cabbage, brussel sprouts) need to be fed in moderation?
  - (A) They are high in calcium oxalate
  - (B) They give rabbits diarrhoea
  - (C) Rabbits shouldn't eat vegetables
  - (D) They don't contain enough calcium
3. Why are feeding behaviours important in rabbits?
  - (A) We need to increase foraging behaviour to help relieve boredom
  - (B) Helps to increase exercise and decrease obesity rates
  - (C) Correct time eating helps with overall digestion
  - (D) All of the above

# Exotic pet welfare and ethics

Shakira Free-Miles

Exotic pets or wild animals? Why have we categorized them differently, they are not pets, they are wild animals. Is this a subconscious way to make them appear more domesticated than they ever will be, or to help these animals become more socially acceptable?

## ETHICS

Animals considered as 'exotic pets' range from parrots, to snails, meerkats to monkeys and leopards to lizards, all of whom need specialist care, due to their basic species-specific needs. Meeting their 'welfare' needs seems to be not only a challenge, but in some cases almost impossible

to define or guarantee. Yet legislation is poorly enforced around their species-specific needs, making 'welfare' itself difficult; it is questionable whether they should even exist in captivity.

When it comes to ethics, can we morally justify keeping such complex animals at all in an artificial environment when even their most basic needs of survival are so difficult to achieve? Data and research show that mortality rates are high, longevity often not reached and quality of life questionable in terms of the benefits of their captivity.

When taking the journey of a potential wild animal owner there is no obligation to research their specific needs or have any basic knowledge. The system allows multiple failures leading to suffering and premature deaths. Veterinary knowledge, care and access to specialists are also sometimes limited. Referrals and second opinions at specialist clinics reflect that these complex creatures are not getting the same level of care as cats and dogs due to simple lack of knowledge. The animals themselves therefore suffer the consequences of being kept in peoples homes.

## WELFARE

The five welfare needs are basic needs of pets (companion animals), however for wild animals these needs are far more complex. Most pet owners know their animals need food and water and how to provide this which is enough for a dog or cat, but for wild animals this is far more complex than a bowl of tap water and some complete food presented in a boring bowl.

The reality is that the complex needs of these animals are often not met at a basic level, leading to suffering, simply down to lack of knowledge and the difficulty involved to recreate their natural life. Some owners do

meet the majority of their needs and care for wild animals they consider as pets incredibly well. But does this justify us keeping them in the first place?

## KEY LEARNING OBJECTIVES

- To encourage delegates to question the suitability of wild animals as 'pets'
- Understand the current legislation covering wild animals as pets
- The concerns of knowledge of so many species and its sometimes detrimental effect on welfare



Sunday 7 April  
Hall 10

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## (VN) Leadership & management

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- 274 09:20–10:05  
**Leadership: what are the benefits for RVNs?**  
Elizabeth Cox
- 274 10:40–11:25  
**Challenges of the head nurse and how to lead your team effectively**  
Renay Rickard
- 275 11:35–12:20  
**Leadership skills for all roles**  
Elizabeth Cox
- 276 13:35–14:20  
**Managing your team through change**  
Renay Rickard
- 276 14:30–15:15  
**Swapping between leadership and management: multitasking nurses!**  
Elizabeth Cox
- 277 15:20–16:05  
**A simple approach to development reviews**  
Renay Rickard

# (VN) Leadership & management

## Leadership: what are the benefits for RVNs?

### Elizabeth Cox

'I'm a veterinary nurse or I'm not the boss, leadership doesn't apply to me!' Leadership is a word that we are all using more, often followed by, but that doesn't apply to me.

Leadership, management, diversifying, practice ownership and career opportunities are phrases that were rarely on a veterinary nurse's horizon, just a few years ago. Now with changes in veterinary business models and change in traditional employment hierarchy, veterinary nurses have more opportunities available to them than ever before. Discussions are happening now with view to thoughts on advanced practitioner status for nurses or even veterinary nurse prescribers. With all the developments that are ongoing and more that can't be imagined, the future for veterinary nursing looks bright.

Older traditional thoughts on leadership lead us to believe that a leader is a person that others follow, often a team when in veterinary practice. We are now all encouraged to think of ourselves as leaders whether that is personally, in the consultation room, heading up a large organization or somewhere in-between.

Being a leader can often feel lonely, especially when you have effectively moved out of the team, after a promotion for example. Leadership may require direction, but a leader is still part of a team. It can be an opportunity to make a difference, simply from ways of working to developing people. Traditionally, veterinary nurses felt they had little control of their position in practice, beyond the possibility of them becoming head nurse. Head nurses have historically been appointed on a time-served basis or the next in line. Little consideration was given to ensuring the nurse had or was trained in the specific skills required of a leader. It is becoming more common to

hear of roles such as senior theatre nurse, or medical nursing manager, which better describe the role of shared leadership in areas specific to skills and interests. The title of head nurse may not be commonplace in a few years.

This presentation will explore what leadership is from a nursing perspective, and what your leadership role is. It will also discuss areas of opportunity, areas that you can learn from, and hopefully make you think differently. You are a veterinary nurse, you are a leader already, now it's time for you to explore it, and, if you want to, develop it further.

### KEY LEARNING OBJECTIVES

- Understanding and defining the benefits of leadership, both personal and for a team
- Understanding your role as a leader and where it happens
- Identify areas for your development and opportunity

### MULTIPLE CHOICE QUESTIONS

1. What is a personal benefit of leadership?  
(A) Direction  
(B) Empowering  
(C) Control  
(D) More work
2. What is the aim of a leader?  
(A) Ignoring obstacles  
(B) Directing personal agenda  
(C) Providing clear direction  
(D) Shielding your team from challenges
3. What opportunity does leadership bring?  
(A) Personal gain  
(B) Development of a team  
(C) Keeping things the same  
(D) Control of situations

## Challenges of the head nurse and how to lead your team effectively

### Renay Rickard

During this session we will be discussing the role of a team leader and how that may differ from a manager or 'head' person. It is important for a leader to know the expectations of their team along with the owners/directors of a business, as without a clear path for themselves it makes it difficult for a leader to be followed.

We will also talk about the challenges faced by someone who has evolved into a leadership role versus someone who has been employed specifically for that role. It is important that as an effective leader we are aware of our own leadership and communication style and how this will be key to how effective we are. Learning to understand ourselves as communicators and how we need to be adaptable at times to work effectively with individuals and groups within the practice team is important. There are also situations where a different leadership style is needed.

### KEY LEARNING OBJECTIVES

- Understanding the difference between leading and managing effectively
- Knowing your own leadership style
- Being able to adapt your style to different teams and situations

## MULTIPLE CHOICE QUESTIONS

- Which of the following is a quality of a good leader?
  - Controlling
  - Unfair
  - Dictatorial
  - Forward thinking
- Which of these situations is not a scenario that could see the veterinary nurse as the main leader?
  - A nursing consultation

- Organizing an open day
  - Scrubbed in during orthopaedic surgery with an experienced surgeon
  - Working alongside a new graduate veterinary surgeon during their induction period
- What is an indicator that you are leading a team effectively?
    - Apathy
    - Resistance to change
    - Engagement
    - Conflict

# Leadership skills for all roles

**Elizabeth Cox**

It is common for veterinary nurses to believe they don't have a leadership role within practice. With an ever increasing market of leadership training provision, it is important that nurses take this opportunity to develop this skill. Leadership and management training is not generally provided as part of the student veterinary nurse training. Whilst a newly qualified nurse should be spending an initial period honing their skills post registration, nurses are often required to step into roles such as head nurse or clinical coach. Moving from being part of the team to leading a team is a challenge for most people, without the added pressures of being recently qualified. It is not surprising that many nurses struggle with the changes that are required of them, without ever being formally taught the skills that are required of such roles. One size does not fit all, and the art of leadership and management is knowing where different approaches are required for individuals and situations, but that different roles also require different skills. The role of a mentor is very different to that of a coach.

Now with further changes in veterinary business models and ownership, traditional employment hierarchy and expectations have changed. Veterinary nurses have greater opportunities than ever before. Career progression may lead to increased requirements of leadership and management skills, but do nurses see that they have a lot of these abilities already and are using them on a daily basis?

The role of a veterinary nurse certainly is diverse and requires the wearing of many different hats. This

presentation will discuss and explore the various areas where a veterinary nurse uses leadership skills. It will examine the different skills required for various roles. It will also help you to examine and question what the needs of an individual or situation are, and how to adapt your approach. The presentation will examine several case examples.

## KEY LEARNING OBJECTIVES

- Understand the different skills required for different roles
- Identify the needs of the individual
- Adapt your approach with differing requirements

## MULTIPLE CHOICE QUESTIONS

- What is the specific requirement of a mentor?
  - Telling the mentee what to do
  - Doing things for them
  - Dismissing their concerns
  - Listening to them
- What is an ideal way of supporting the needs of a team?
  - Telling them what is required
  - Collaborative discussion
  - Providing solutions
  - Time limitation
- Which changes don't require an alternative approach?
  - Change in circumstances
  - Change in requirements
  - Changes of time allocation
  - Where agreed objectives have been completed

# (VN) Leadership & management

## Managing your team through change

**Renay Rickard**

Change is a stress trigger – whether a minor day-to-day operational protocol adjustment or a full change in ownership of the business and this needs to be recognized and managed appropriately. We know that the stress trigger is a feeling of a lack of control over a situation and if we can minimize this as far as possible then the effect it has on a team or individual can be reduced. Learning to appreciate how a change could affect our team, whether physically or emotionally, and how they could react is key, as people will react differently and sometimes unexpectedly. A team that has been led in a way that makes them feel secure and resilient to change will function better than one that starts to panic and becomes closed and defensive. The way that a leader responds to change is the most important factor as to how their team will also respond, so we will also discuss a personal strategy for this.

### KEY LEARNING OBJECTIVES

- Recognizing and understanding when a change is happening

- Recognizing the effects on your team of a period of change
- Learning to manage an adaptive strategy for leading your team through change

### MULTIPLE CHOICE QUESTIONS

1. Which of these situations is not a change?  
(A) Salary review meeting  
(B) Promotion  
(C) Qualification  
(D) Change of ownership
2. Which of these reactions is not an effect of change if managed positively?  
(A) Apathy  
(B) Conflict  
(C) Team motivation  
(D) Insecurity
3. When forming an adaptive strategy which of these statements is FALSE?  
(A) New opportunities and challenges must be dealt with effectively  
(B) It is not necessary to deal with change  
(C) Projects and tasks should have time deadlines to work towards  
(D) Outcomes should be able to be measured

## Swapping between leadership and management: multitasking nurses!

**Elizabeth Cox**

Leader, manager, coach and mentor – you are often the same person several times a day. How does that work? What skills are specific to each role?

Leadership and management are words to many in the veterinary nursing profession that are rarely used or understood. This is unsurprising when many nurses find themselves in a senior position in practice, with little or no training. Traditionally, senior nurses have been appointed on a time-served basis or next in line. Commonly CPD allowances have been used for clinical training and, even with a role change, non-clinical training is often overlooked.

The role of a veterinary nurse shares common skills that a leader and a manager also require: skills of adaptability, seeing the wider picture, future planning and reacting well to changing circumstances and people. These skills are used every day as a veterinary nurse. When stepping in to the role of a leader, those skills are often forgotten, moving to a telling staff what to do,

replacing the previous teamwork ethos. Adding a move to a different work location for long periods of time, be that in an office or another building, and a feeling of lack of control can fog previous thinking. In large organizations, leaders and separate managers are employed, but in veterinary practice that person is more commonly both the leader and the manager. No matter where a person is working, leadership requires us to be both, and to understand where and how to apply the different skills.

Clinical coaches in practice will alter their approach and style depending on the individual student, and the various stages a student nurse travels through. Clinical coach training is one of the few non-clinical areas where training and ongoing CPD are expected.

The lines between leadership and management are often blurred, requiring a flexible approach. Identifying when and what is needed can be a challenge. These skills are rarely taught and it is common for nurses in a senior role to confuse them or use them incorrectly. This presentation will look at the similarities and differences between the two skills. It will discuss why and when to swap between them. It will also look at how to identify your specific skills and gaps as a leader and manager.

### KEY LEARNING OBJECTIVES

- Understand the difference between leadership and management
- Knowing why and when to swap between leadership and management
- How to identify your personal skills and gaps of a leader and manager



## MULTIPLE CHOICE QUESTIONS

- Which of the following is a trait of a good manager?
  - Poor organisation
  - Control of events
  - Poor time management
  - Overruling
- Which of the following is an example of a need to swap between leader and manager?

- Sudden change
  - Personal choice
  - Unhappy with outcomes
  - Frustration with team
- Which of the following is an indication of a gap in personal skills in management?
    - Lack of team engagement
    - Organized work schedule
    - Happy effective leader
    - Improved team performance

# A simple approach to development reviews

**Renay Rickard**

A development review is a very specific tool that should be used to ensure that the team member knows what is expected of them over a period of time, and it can be discussed as to how this will be achieved with support and guidance from the team leader or other members of the practice team. The outdated 'annual appraisal' approach has often been seen as an annual telling-off where the employee feels there is a one-sided approach with regard to how they should do better. The development review is very much a two- (or more) sided dialogue that focuses on the forward development of an individual and therefore the team and practice team. The benefits of this are also positive for clients, animals in our care and the overall business. We will be discussing a practical framework and plan that can be implemented by a new team leader from scratch or that could be introduced to a well-established team for which a more structured approach could be used.

This session will also discuss the challenges of working within a team whilst leading and being responsible for its development. For veterinary nurses who have evolved into a leadership role this can be daunting. We will be looking at ways that difficult conversations can be avoided or managed so that the veterinary nurse gains confidence in this area.

## KEY LEARNING OBJECTIVES

- The benefits of an effective development review process for your team
- How to develop a simple plan for carrying out development reviews for your team members
- How to implement a development action plan

## MULTIPLE CHOICE QUESTIONS

- Which of these is a negative effect of not carrying out regular development reviews for your team members?
  - Improved clinical skills
  - Increased or maintained high morale amongst the team
  - Demotivated team
  - Increased business performance
- Which of these is not required during a development review?
  - Pay review
  - Planning
  - Communication
  - Time
- Which of the following are not vital within an action plan?
  - Measurable outcome
  - Complete confidentiality
  - A realistic timescale
  - Training or CPD requirement



Sunday 7 April  
Hall 11

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## (VN) Nutrition

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- 280 09:20–10:05  
**Making and implementing a nutritional assessment**  
Georgia Woods
- 280 10:40–11:25  
**Compliance for nutritional recommendations**  
Georgia Woods
- 281 11:35–12:20  
**Feeding the renal patient**  
Georgia Woods
- 282 13:35–14:20  
**Nutritional management of the hyperthyroid cat**  
Georgia Woods
- 282 14:30–15:15  
**Nutritional management of gastrointestinal disease I**  
Aarti Kathrani
- 283 15:20–16:05  
**Nutritional management of gastrointestinal disease II**  
Aarti Kathrani

# Making and implementing a nutritional assessment

Georgia Woods

Nutritional assessments require a wealth of information, not only on the current nutritional provision but also taking into consideration the many medical and lifestyle factors that affect nutritional requirements for each patient. As nutrition plays a vital role in disease management, health and well-being, it is essential to make accurate assessments in order to deliver optimal nutrition to every patient.

Understanding other factors in the patient's life can also assist you in making the correct assessment of what the nutritional requirements are, for example, is the dog in training, and so does the owner require a high-value reward to facilitate this? Taking a detailed history or inventory of all activities the pet and owner undertake and using this information in conjunction with the nutritional information already obtained means that a holistic approach can be taken and this will improve the quality of the advice given. Repeated questioning via a variety of methods will often be needed and careful listening and observation during the conversation will be essential to extract all the necessary information. Although each assessment and plan must be tailored to the individual there will be common factors to all assessments that should be considered.

This lecture will discuss the various elements essential to all nutritional assessments and how creating a standardized approach by creating bespoke nutritional assessments for your practice can be very useful. Practice-specific assessment forms will ensure that the correct information is gathered and that everyone within the practice is familiar with the nutritional plans subsequently set.

It is also useful to have a nutrition champion within the practice who can oversee the development of the assessment forms and who can monitor and review how the practice makes nutritional assessments both within the hospital and in consultations.

## KEY LEARNING OBJECTIVES

- Recognize the best methods for obtaining key pieces of information needed to make a thorough nutritional assessment
- Describe the important elements of all nutritional plans and how to implement them
- Discuss how the nutritional needs of the patients must be balanced against the owners wishes, understanding, level of compliance and resources

## MULTIPLE CHOICE QUESTIONS

1. What are the four most useful pieces of information to gather when assessing a patient's nutritional need?  
(A) Age, sex, health status, owner preference  
(B) Breed, age, sex, health status  
(C) Age, sex, owner income, breed  
(D) Owner preference, breed, environment, sex
2. In practice, which is the best estimation for the energy requirement of the patient?  
(A) Basal Energy requirement (BER)  
(B) Maintenance energy requirement (MER)  
(C) Resting energy requirement (RER)  
(D) Daily energy requirement (DER)
3. Which amino acid is essential for all feline diets?  
(A) Arginine  
(B) Valine  
(C) Lysine  
(D) Taurine

# Compliance for nutritional recommendations

Georgia Woods

Within a first-option practice or a referral hospital setting, compliance with any nutritional advice given to clients can at times be challenging. Due to the huge amount of information available, which is often conflicting, it can be confusing for owners to know where to turn for the correct information for their pet and whose information it would be best to follow. When discussing nutrition with owners it is important to let them know that the information being given will be evidence based and so can be relied upon.

When making nutritional recommendations, it is vital the pet owner understands the importance of good compliance, and how poor compliance may adversely affect the health of their pet. Poor nutritional compliance and subsequent nutritional inadequacy may be detrimental to the pet and in the worse cases may even be fatal, so the correct recommendation must be made, and it must be explained clearly to the owner why a change in diet from the current diet may be necessary.

It is not, however, simply what advice is given, it is also the manner in which it is delivered and the relationship of trust that is formed between veterinary professional and client that will influence the level of compliance. Often owners require support though nutritional change, as this can be a difficult time and the owners' resolve may diminish without appropriate support.

This lecture will discuss firstly how gathering dietary history, medical history and lifestyle information will be key to making recommendations that the owner is able to comply with. It will also discuss the various elements

that will be common to those recommendations and how the language used during the information gathering and delivery can affect the level of compliance.

## KEY LEARNING OBJECTIVES

- Recognize the reasons behind why some pet owners struggle to comply with the nutritional advice given
- Describe the ways in which compliance and communication can be improved, with an emphasis on the importance of the relationship built between veterinary professional and client
- Discuss ways of tailoring the nutritional advice given, considering the individual set of circumstances and how recommendations may require compromise on both sides

## MULTIPLE CHOICE QUESTIONS

1. On average, how many times would you need to ask a client what they are currently feeding their pet?

- (A) Less than 5 time
- (B) More than 3 times
- (C) More than 10 times
- (D) Less than 3 times

2. Who in the household is it most important to speak to when making nutritional recommendations for a family pet?

- (A) The person who feeds and exercises the pet most frequently
- (B) All adults living with the pet
- (C) All members of the household
- (D) The person who exercises the pet most often

3. What is the most helpful thing you can do to help create good compliance from pet owners?

- (A) Write down all instructions for the owner to take away
- (B) A follow up phone call 24 hours after the advice is given
- (C) Regular check-ups/check-ins
- (D) All of the above

# Feeding the renal patient

**Georgia Woods**

The main function of the kidneys of the dog and cat is homeostasis, the regulation of water, electrolytes, acid-base balance and the excretion of waste products such as urea. Renal disease in both cats and dogs is a degenerative condition that sadly has no cure. In many instances, however, the patient's life can be prolonged and their quality of life improved through dietary management.

Patients with renal disease have very specific nutritional needs to support the reduced or impaired kidney function. In cases of chronic kidney disease, which affects a greater proportion of cats than dogs, patients often lose weight and muscle mass as the disease progresses and so optimal, tailored nutrition for these patients is essential. The lecture will discuss the point at which a renal diet is needed and the many ways in which diet can reduce renal load.

To provide optimal nutrition an assessment must firstly be made. It should consider the medical implications of the disease stage, the preferences of the pet, the lifestyle of the pet and the preferences of the owner. Without all of this information, compliance with the nutritional plan may be difficult for the pet and owner.

Patients with renal disease will often become anorexic or partially inappetent so alternative solutions for feeding these patients may be required and must be considered when setting a plan to feed them. As patients with acute or advanced renal disease will be admitted into the veterinary hospital, the lecture will also discuss

techniques for providing nutrition to these patients and the necessity of placing a feeding tube in some instances.

## KEY LEARNING OBJECTIVES

- Recognize the challenges created by the disease process, and the specific elements of a diet that will support the patient
- Describe the finer details of the micro- and macronutrient requirements for both cats and dogs in chronic and acute renal disease cases
- Discuss the various factors to consider when feeding a patient with poor appetite, changing preferences as the disease progresses

## MULTIPLE CHOICE QUESTIONS

1. What percentage of cats over 10 years old have some degree of chronic kidney disease?

- (A) 30% (C) 45%
- (B) 22% (D) 10%

2. What is the most important macronutrient to restrict but balance correctly, for patient with renal disease?

- (A) Carbohydrates (C) Proteins
- (B) Fats (D) Water

3. What micronutrient is it most important to restrict to prevent stimulation of the parathyroid gland in patients with chronic kidney disease?

- (A) Magnesium (C) Sodium
- (B) Calcium (D) Phosphorus

# Nutritional management of the hyperthyroid cat

Georgia Woods

Hyperthyroidism is a common disease of senior cats (over 8 years old) and in the UK, one in 10 cats is thought to have the condition. Cats often present with poor body condition despite owners reporting a ferocious appetite. Poor skin and coat, tachycardia, vocal changes and hyperactivity are also commonly seen, alongside the presence of a palpable goitre in the neck. As the thyroxine produced by the thyroid gland drives metabolism, an overactive thyroid gland means that the metabolism works at an abnormally high level, burning calories at a higher rate and, together with the tachycardia commonly observed in these patients, it puts extra load on the heart. Subsequently cardiac structure and function are often affected which, if left untreated, may be very serious for the patient. Renal disease is also frequently seen and is the most common concurrent disease, found in around 30% of cases.

There are four main ways hyperthyroidism in cats can be managed or permanently cured. Medication and dietary management can reverse the condition whereas performing a surgical thyroidectomy or delivering radiotherapy can permanently cure the cat of the disease. The lecture will discuss how the recently developed dietary solution for cats has become a viable treatment method and can be a very successful way to manage the production of thyroid hormones within the patient, thus controlling the disease.

## KEY LEARNING OBJECTIVES

- Recognize the physiology that is occurring within the cat with hyperthyroidism and the pros and cons of the various treatment methods available
- Describe the ways in which diet is able to have a positive effect on the management of the disease but also the need to guard against iatrogenic hypothyroidism
- Discuss the need for complete compliance with the dietary advice given, how this may be achieved

## MULTIPLE CHOICE QUESTIONS

1. What is the most common concurrent disease seen but often masked by hyperthyroidism in cats?  
(A) Urinary disease  
(B) Renal disease  
(C) Cardiac disease  
(D) Obesity
2. How can diet be used to treat hyperthyroidism?  
(A) By reducing the amounts of thyroid hormone being produced  
(B) By increasing the amounts of thyroid hormone being absorbed  
(C) By blocking the absorption of thyroid hormones  
(D) By increasing the amounts of iodine in the diet
3. In what year was the first diet specifically design to treat hyperthyroidism in cats launched?  
(A) 2001  
(B) 2011  
(C) 2012  
(D) 2016

# Nutritional management of gastrointestinal disease I

Aarti Kathrani

Acute gastroenteritis is a common presentation in veterinary practice. There are several different causes, such as infectious, toxic and dietary factors. Collection of a diet history is critical for these cases to rule out food-induced diarrhoea, which can include a recent change to a high-fat diet or dietary indiscretion from consuming table food or access to garbage. A commercial therapeutic gastrointestinal (GI) diet, such as Hill's Prescription Diet i/d, Purina ProPlan Veterinary Diets EN and Royal Canin Veterinary Diet Gastrointestinal, is recommended for management of acute gastroenteritis, as these diets are highly digestible and some formulas for dogs are lower in fat (Hill's Prescription Diet Canine i/d Low Fat and Royal Canin Veterinary Diet Canine Gastrointestinal Low Fat). It is best

to feed patients with acute gastroenteritis little and often. Some patients with acute gastroenteritis may need an increased-fibre diet to manage their clinical signs, therefore if their stool quality worsens or does not improve with a highly digestible diet then a higher-fibre diet should be considered (e.g. Royal Canin Veterinary Diet Gastrointestinal Fibre Response, Hill's Prescription Diet w/d).

The term food-responsive enteropathy (FRE) describes a group of diseases resulting in chronic gastrointestinal signs that are responsive to dietary management alone. There are three categories of commercial therapeutic diets that are available for the diagnosis and management of FRE in dogs and cats: hydrolysed diets (Purina ProPlan Veterinary Diets HA dry food, Hill's Prescription Diet z/d, Royal Canin Veterinary Diet Hypoallergenic, Dechra Specific Allergen Management), limited-ingredient novel-protein diets (e.g. Hill's Prescription Diet d/d, Royal Canin Veterinary Diet Sensitivity) and gastrointestinal diets (see above). In addition, a limited-ingredient, complete and balanced home-cooked diet, formulated by a board-certified veterinary nutritionist could also be used.

Dogs and cats with constipation may exhibit tenesmus, dyschezia and abdominal pain. Owners of constipated pets should be questioned about consumption of bones and

raw food as this can result in constipation in dogs. Maintaining normal hydration status is important in managing patients with chronic constipation or obstipation. For patients with chronic constipation that still have some level of colonic motility, insoluble or mixed fibre may help. The constipated animal should be well hydrated before a high-fibre diet is introduced. The motility patterns of patients with obstipation are completely abolished and therefore, in these patients, fibre-enhanced food and fibre supplements should not be used as this may worsen their clinical signs. In these cases a highly digestible, low-residue diet with a high energy density should be used to markedly reduce faecal mass. If the animal is overweight, a weight-reduction programme should be considered.

## KEY LEARNING OBJECTIVES

- To describe the nutritional strategies for the management of acute gastroenteritis in dogs and cats
- To list the advantages and disadvantages of the different categories of diets used for the management of food-responsive enteropathy in dogs and cats
- To describe the nutritional strategies for the management of constipation/obstipation in cats

## MULTIPLE CHOICE QUESTIONS

1. Low-fat diets are sometimes preferred for the management of acute gastroenteritis in dogs. Which one of the following statements is correct with regards to the effect of low-fat diets on the gastrointestinal tract?

- (A) Low-fat diets increase gastric retention time
  - (B) Low-fat diets are more palatable and more calorically dense compared to high-fat diets
  - (C) Low-fat diets increase gastroesophageal tone
  - (D) Low-fat diets increase pancreatic secretion
2. Hydrolysed diets can be used to manage food-responsive enteropathy in dogs and cats. Which one of the following statements is correct with regards to the advantages of using a hydrolysed diet for the treatment of food-responsive enteropathy in dogs and cats?
    - (A) Hydrolysed diets are more palatable compared to over-the-counter or novel-protein diets
    - (B) Hydrolysed diets are cheaper than novel-protein and over-the-counter diets as they contain less protein
    - (C) Hydrolysed diets contain more calories per gram than novel-protein and over-the-counter dry foods
    - (D) A complete diet history of antigen exposure is not necessary before starting a hydrolysed diet
  3. Which one of the following therapeutic diets would be most suitable for a cat with obstipation due to megacolon and a body condition score of 6/9?
    - (A) Purina ProPlan Veterinary Diets Feline OM tinny food
    - (B) Purina ProPlan Veterinary Diets Feline EN tinny food
    - (C) Hill's Prescription Diet Feline w/d dry food
    - (D) Royal Canin Veterinary Diet Feline Obesity Management dry food

# Nutritional management of gastrointestinal disease II

**Aarti Kathrani**

Nutritional management of canine pancreatitis centres on the reduction of dietary fat by at least 50% of what is currently being fed. Commercial therapeutic options for low-fat diets include Royal Canin Veterinary Diet Gastrointestinal Low Fat and Hill's Prescription Diet i/d Low Fat. If further fat reduction is desired, then a home-cooked diet using ingredients such as low-fat cottage cheese, skinless boneless chicken breast, tilapia and lean minced turkey with white rice can be tried. An unbalanced diet using these ingredients can be fed for 3–5 days, however

longer-term feeding requires formulation by a board-certified veterinary nutritionist. Fasting dogs with pancreatitis is no longer recommended, as enteral nutrition, even in small amounts, is important for enterocyte health. As obesity can predispose to recurrent episodes of pancreatitis, addressing weight loss in overweight and obese dogs needs to be considered in the long-term feeding plan.

Dietary fat reduction is not a common strategy for the management of feline pancreatitis; instead, as these cats can be affected by triaditis (cholangiohepatitis, pancreatitis and inflammatory bowel disease), a commercial therapeutic hydrolysed diet is selected for management of these cases. Purina ProPlan Veterinary Diets Feline HA dry food is commonly selected due to its lower fat content compared to the other commercial therapeutic hydrolysed diets available for cats. However, if a wet formulation is required, Hill's Prescription Diet Feline z/d or the Dechra Specific hydrolysed salmon feline formula can be tried.

Commercial therapeutic hepatic diets (e.g. Hill's Prescription Diet l/d, Royal Canin Veterinary Diet Hepatic) are generally indicated when the dog or cat has evidence

# (VN) Nutrition

of protein intolerance, such as urate urolithiasis or hepatic encephalopathy associated with their liver disease. Raised liver enzyme activities or liver changes on imaging without signs of protein intolerance or reduced liver function are not usually an indication for use of these diets. However, these diets can be used for the management of copper hepatopathy in dogs, as they are suitably copper restricted. These diets are also commonly used in the management of canine and feline portosystemic shunts. Vegetarian diets such as Purina ProPlan Veterinary Diets Canine HA dry food or a home-prepared diet of cottage cheese, egg and white rice, formulated by a board-certified veterinary nutritionist, are also suitable options. Diets suitable for growth also need to be taken into consideration when considering a diet for a puppy or kitten with a portosystemic shunt.

## KEY LEARNING OBJECTIVES

- To describe the nutritional strategies for the management of pancreatitis in dogs and cats
- To list the indications for use of commercial therapeutic hepatic diets in dogs and cats with liver disease
- To describe the nutritional strategies for the management of liver disease and list the different dietary options available

## MULTIPLE CHOICE QUESTIONS

1. Which one of the following statements is correct with regard to nutritional management of dogs with acute pancreatitis?
  - (A) A diet with at least a 50% increase in dietary fibre should be fed
  - (B) A diet with at least a 50% decrease in dietary fat should be fed
  - (C) The dog should be fasted for at least 3 days after the onset of clinical signs
  - (D) The dog should be a diet at no more than 50% of its daily resting energy requirement throughout the length of hospitalization
2. Which one of the following is an indication for starting a commercial therapeutic hepatic diet in a dog?
  - (A) A dog with an alkaline phosphatase (ALP) activity five times the upper reference range, with no other abnormalities on the biochemistry
  - (B) A dog with increased pre- and post-prandial bile acids, with no other abnormalities on the haematology and biochemistry
  - (C) A dog with a 5-cm mass in the liver, documented on ultrasonography, but no abnormalities of liver function on the biochemistry
  - (D) A dog with a portosystemic shunt with no hepatic encephalopathy but presence of urate uroliths
3. Which one of the following diets would be LEAST desirable in a dog with hepatic encephalopathy from a portosystemic shunt?
  - (A) Royal Canin Veterinary Diet Canine Renal dry food
  - (B) Purina ProPlan Veterinary Diet Canine HA dry food
  - (C) A home-prepared diet of cottage cheese and white rice, formulated by a board-certified veterinary nutritionist
  - (D) Royal Canin Veterinary Diet Canine Hepatic dry food



## Section V

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# Management streams

Thursday 4 April

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Thursday 4 April  
Hyatt Ballroom

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# New to Business Leadership

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- 288 08:30–09:15  
**Leadership: the art of managing uncertainty in veterinary practice**  
Brian Faulkner
- 288 09:25–10:10  
**Acquiring the 'right' to lead: the difference between knowledge and self-belief**  
Brian Faulkner
- 289 11:05–11:50  
**Leadership and culture: two sides of the same coin**  
Brian Faulkner
- 290 12:00–12:45  
**Leading your sub-team managers**  
Brian Faulkner
- 291 14:05–14:50  
**Setting up from scratch**  
Brian Faulkner
- 292 15:00–15:45  
**So you're now a clinical director. Help!**  
Brian Faulkner

## Leadership: the art of managing uncertainty in veterinary practice

**Brian Faulkner**

Leadership is a mysterious commodity. Many theories have been used to try and conceptualize and teach it over the ages but many seem abstract, impractical or difficult to apply. Rarely do we have the time to think abstractly during a particular moment of crisis.

This lecture will look at the impact of uncertainty, not just on our need for leadership in general but with a particular focus within veterinary practice. Uncertainty is often assumed to occur during times of dramatic change. And whilst major changes heighten our sense of uncertainty, life is in fact uncertain on a day-to-day basis. What's more, certainty occurs irrespective of how knowledgeable or competent we are. This is because uncertainty often results, not necessarily from an ignorance about *which* information is needed, but from a lack of that information *right now* whilst trying to decide what to do.

Furthermore, it is important that we are aware of the impact of how we interpret and deal with feelings of uncertainty on our levels of stress, self-doubt and self-confidence. This is reflected in my stress equation which states  $\text{stress} = \text{uncertainty} \times \text{urgency}$ . Making decisions and living with the doubt, the disappointment and the disapproval if or when we get them wrong often provoke feelings of anxiety and stress.

If we are to be effective (i.e. make decisions intelligently) when faced with doubt we need to be able to decide despite a lack of the desired levels of information. The hallmark of intelligence is the ability to adapt and I call the ability to do so when feeling uncertain UQ, which I define as 'our ability to make decisions with and about the information available'.

This lecture will demonstrate how these moments of uncertainty complicate our team's ability to make decisions during our pursuit of the four outcomes of clinical resolution, client satisfaction, financial resolution and colleague satisfaction, whilst working in general practice.

### KEY LEARNING OBJECTIVES

- The relevance of uncertainty in veterinary practice
- The impact of uncertainty on leadership
- UQ: our ability to make decisions with and about the information available

### MULTIPLE CHOICE QUESTIONS

1. What is the concept of leadership?
  - (A) The same as management
  - (B) A passing 'fad'
  - (C) Only of importance to those in the armed forces
  - (D) Essential to the suitability of all organizations
2. What is the hallmark of intelligence?
  - (A) Loads of A stars in your A levels
  - (B) Coming top in your year at school or university
  - (C) Making the most money
  - (D) The ability to adapt to emerging circumstances
3. Which of the following do you believe?
  - (A) Leadership is genetic and cannot be taught
  - (B) Leadership is correlated with intelligence
  - (C) Leadership requires an ability to deal with the unknown
  - (D) Leadership doesn't apply to veterinary contexts because veterinary practice is different

## Acquiring the 'right' to lead: the difference between knowledge and self-belief

**Brian Faulkner**

Leadership requires having a sense of command, where being in command means having authority over and responsibility for those you lead. Authority means having 'the right to exercise power'. In other words, to 'be in charge' requires a sense of having the right (i.e. an entitlement)

to *enforce or prevent other people from doing things*. As we all know, having a sense of entitlement with respect to 'enforcing or preventing' others to do certain things can manifest either negatively or positively.

The 'negative' view of a sense of entitlement to 'enforce and prevent' manifests as people who crave – or assume – power, authority and control in pursuit of the elevated personal status they believe it represents. These people either feel they already do, or should, 'own this ground' and their desire to *enforce or prevent others* from doing certain things is usually motivated by personal goals.

In contrast, the 'positive' view of a sense of entitlement to 'enforce and prevent' manifests as people who want to make the world a better place for their group, as well as themselves. These people are more concerned about gain for the greater good than simply elevating

their personal status. History is, of course, full of many celebrated martyrs who 'died for the cause', often in opposition to tyranny and oppression.

If you asked most people which sense of entitlement they would like to be seen as, they would, of course, opt for the more socially acceptable and altruistic positive view. Most people want to be seen as 'nice people'. And this is normal. From an early age we are encouraged to get along and build relationships based on trust, empathy and respect. We are encouraged to be humble and not to bully or intimidate.

The challenge however with this 'nice person' mindset is that it is not automatically conducive to embracing 'command' which by nature requires us to *enforce or prevent other people from doing certain things*. Enforcing or preventing means taking a stand and making decisions which probably won't please all of the people all of the time; it means defining and upholding standards by addressing and correcting inappropriate behaviour. A failure to make tough decisions or a tolerance of self-indulgent behaviours or disrespect for social boundaries is ultimately a failure to lead.

Therefore, in order for 'nice people' to lead and command successfully (i.e. advance their mission) – and be respected and popular – they often need to have a *conscious moment of realization* that they need to learn how to 'reconcile' their admirable social values of trust, empathy, humility and respect, which makes them popular and credible leadership candidates on the one hand, with the need to *enforce or prevent people from doing things*, on the other. This 'moment' is the essence of acquiring – i.e. learning – 'the right to lead'. Most respected leadership training academies (Harvard, Sandhurst, plus most respected MBA providers) help aspiring leaders conceptualize, understand and develop this 'right to lead' by fostering what I call 'cultures of command'

## KEY LEARNING OBJECTIVES

- The meaning of 'being in command'
- The impact of self-beliefs on your motivation to lead
- Cultures of command

## MULTIPLE CHOICE QUESTIONS

1. Which of the following do you believe to be TRUE?
  - (A) Vets don't make good leaders because they are generally nice people
  - (B) Command means authority over and responsibility for your group
  - (C) Leaders must always be formally commissioned
  - (D) Command means exercising power over weaker followers
2. Which of the following do you believe to be TRUE?
  - (A) Leadership is not possible by people who hold immoral values
  - (B) Leadership is not possible by people who break the law
  - (C) Leadership is not possible unless you have been formally commissioned to lead
  - (D) A person's desire to lead is driven by their values and attitudes about their right to do so
3. Which of the following do you believe to be FALSE?
  - (A) Some rights entitle people to do things
  - (B) Some rights prevent people from doing things
  - (C) Some rights are enshrined in law
  - (D) A right isn't a right unless it is enshrined in law

# Leadership and culture: two sides of the same coin

**Brian Faulkner**

We all live within groups (nations, workplaces, families, clubs etc.) which teach us to believe that there are right and wrong ways of defining good outcomes and dealing with problems in pursuit of them. These social 'forces', which act as the blueprint of what we refer to as a group's culture, help members of that group 'know where they stand' in relation to what behaviours and standards are acceptable, rejected or encouraged. Culture gives people a template of how to interpret the world as well as a sense of how to respond when certain things happen. This template makes the 'world' meaningful and

predictable by helping us contain the anxiety that comes from chaos and uncertainty. We are not born with opinions about what is good or bad, right or wrong. Instead we acquire them as we go through life when we *learn what* goals are worth striving for and *why*, as well as *how* we should go about achieving them. We learn our beliefs from the people we spend time with and through the experiences we share.

The process of creating and managing a group's culture has been described as the essence of leadership, whereby both concepts should be viewed as 'two sides of the same coin'. In other words, it is impossible to consider one without the other, as a group's beliefs about 'right and wrong, good and bad' often originate from and are propagated by the leader's own sense of 'right and wrong, good and bad'. If the group is successful, the leader's opinions will be adopted, shared and taken for granted by its members 'as the right way to do things'. Group members who do not agree with the leader's values will often leave during this phase. Whilst *managers* may monitor and measure how well an organization is

# New to Business Leadership

achieving its stated objectives, *leaders* decide *what* those objectives are (i.e. what defines a good outcome) and often *how* they should be achieved (i.e. what is the right way to go about doing things). It has been asserted that it is essential for leaders to achieve a critical level of consensus about right and wrong, good and bad if they wish to unite and mobilize their team in pursuit of a common goal. It is therefore essential that leaders understand the nature of the invisible psychological forces at play within their group if they wish to harness them in order to achieve their objectives.

This talk will look at how this manifests in general practice using Brian's *Colourful Culture* as an example of a cultural philosophy which advocates the pursuit of the four outcomes of clinical resolution, client satisfaction, financial resolution and colleague satisfaction, as well as how tensions arise when different parties value and pursue each of these four outcomes differently.

## KEY LEARNING OBJECTIVES

- The definition of culture
- The role of intangible assumptions and beliefs on what, why and how people spend their time, money and efforts
- The relationship between leadership and culture

## MULTIPLE CHOICE QUESTIONS

1. Which of the following do you believe to be TRUE?
  - (A) Culture is always visible
  - (B) Vets make good leaders because they are generally very cultured people
  - (C) Leaders must indoctrinate their followers
  - (D) Culture is underwritten by a form of psychological DNA which influences a group's behaviour
2. Which of the following is FALSE?
  - (A) Leadership and culture are two sides of the same coin
  - (B) Leadership and culture are unrelated
  - (C) Leadership and culture affect each other
  - (D) Leadership and culture both have tangible and intangible aspects
3. Which of the following do you believe to be TRUE?
  - (A) All veterinary cultures are unique
  - (B) Veterinary cultures always revolve around clinical values
  - (C) Veterinary cultures always revolve around financial values
  - (D) Veterinary cultures always revolve around client values

## Leading your sub-team managers

### Brian Faulkner

Leadership is particularly challenging when you do not have very much direct contact with the various members within sub-teams that form functional units under your command. In veterinary practices there are traditionally four sub-teams (the veterinary team, the nursing team, the receptionist team and the management team) and each of these teams may have team managers or leaders.

In order to be able to do this effectively the leader needs to be able to translate the themes of the previous lectures (containing uncertainty, influencing culture by exercising their right to enforce and prevent others from doing certain things) into a practical system of policies, protocols and behaviours that represent an effective, efficient and coherent operational system for the entire practice.

It is important that sub-teams are clear about how their sub-systems contribute towards the practice's wider overarching themes as well as ensuring that conflicting systems (and orientations) are not creating 'conflict' within the system. To do this well, site leaders need to be able to recognize, understand and articulate which habits and skills are desirable – and undesirable – as well as knowing how to track them via manageable and measurable key performance indicators (KPIs). It is

also important that the site leader regularly meets up with his/her sub-team leaders and discusses meaningful metrics as well identifying any operational issues that need attention.

This talk will build on the previous talks and will use Brian's *Colourful Culture* which advocates the pursuit of the four outcomes of clinical resolution, client satisfaction, financial resolution and colleague satisfaction, as a template upon which to create operational systems that are coherent across all four functional roles. The talk will show how this translates into sub-team systems which can be tracked via manageable and measurable KPIs as well as how to audit and develop the skills, knowledge and attitudes each sub-team leader must nurture within their own team.

## KEY LEARNING OBJECTIVES

- What is a sub-team?
- How do practice leaders conceptualize and integrate sub-team systems and behaviors?
- Measuring outcomes at the sub-team level

## MULTIPLE CHOICE QUESTIONS

1. Which of the following do you believe to be TRUE?
  - (A) It is important to develop policies and systems that are coherent across all sub-teams

- (B) Sub-teams shouldn't have sub-team leaders
  - (C) Sub-team leaders must indoctrinate their team members
  - (D) Sub-team meetings should only happen once a year
2. Which of the following do you believe to be TRUE?
- (A) Sub-team meetings should always be led by a veterinary surgeon
  - (B) Sub-teams do not need leaders
  - (C) Sub-team meetings should always be held outside of the practice

- (D) Sub-team meetings will most likely focus on operational issues
3. Which of the following do you believe to be TRUE?
- (A) Sub-team meetings should deal with clinical, client, financial and team member issues as required
  - (B) Sub-team meetings should never include issues about clinical standards
  - (C) Sub-team meetings should never include issues about customer service
  - (D) Sub-team meetings should never include issues about money

## Setting up from scratch

**Brian Faulkner**

Setting a veterinary practice up from scratch requires leadership. Doing so is probably one of the quickest ways of developing the skills, knowledge and attitudes required to lead. This talk will focus less on the actual skills, knowledge and attitudes required as well as helping you decide whether – and how – setting up is for you. The lecture will look at the upsides of setting up as well as the risks and challenges of doing so.

It is essential that you know how to distil your ambitions and objectives into a business plan, either to apply for finance or at the very least manage your own expectations, as well as contingency planning by running worst, best or most-likely case scenarios.

Your business plan will need various sub-sections: summary, leadership–management team, site location and market analysis, operating strategy and tactics, skills, training and development plan, marketing plan as well as finance and management accounts.

We will look at how to analyse a market opportunity in terms of locations in relation to existing competitors and how this relates to your own 'objectives–strategy–tactics' decisions. We will look at how to create a budget plan based upon assumptions of various scenarios of client recruitment and retention multiplied by average spends and annual yields. We will look at marketing tactics and how to get the word out about who you are and why clients should try you out, as well as external and internal marketing tactics that can encourage them to register and buy.

And finally we will look at how to exit your practice and what you need to consider at the beginning to ensure you have not worked, toiled and created something that isn't going to be saleable in order to finance your 'retirement' plan years after you have left the business you set up and sold.

## KEY LEARNING OBJECTIVES

- Skills, knowledge and attitudes required to lead a set-up practice
- The key sections of a business plan
- Competitor/market analysis

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is TRUE?
  - (A) There's no point in setting up as the UK veterinary market is saturated
  - (B) There's no point in setting up as the corporates will out-compete you
  - (C) One ownership model is as good as the other
  - (D) Veterinary practice ownership is life changing in many ways
2. Which of the following is TRUE?
  - (A) Business plans are essential even if you don't have to borrow money to set up
  - (B) Business plans are only needed if you don't have to borrow money to set up
  - (C) Business plans are meaningless as the forecasts are almost always wrong
  - (D) Business plans must be created by a qualified accountant
3. Which of the following is TRUE?
  - (A) There's no point in thinking about how you can exit a business at the set-up stage
  - (B) You can only exit a veterinary business after at least 10 years
  - (C) Veterinary practices never make a profit in the first year
  - (D) Considering your exit strategy whilst setting up is always sensible, otherwise you might get stuck with a business you cannot sell

# New to Business Leadership

## So you're now a clinical director. Help!

**Brian Faulkner**

The title CD means clinical director. The CD role is the core leadership/management role within veterinary practice. This usually means that you are 'in command' of the veterinary practice's business operations and it is likely that all the veterinary surgeons in the practice as well as the head nurse and possibly even the practice manager will report to you.

CD roles are typically used with corporate organizations, although they can be used within larger independently owned veterinary groups. You can become a CD via various routes:

- You may have been promoted from a veterinary clinical role into clinical directorship
- You may have been the former owner of the practice and are now employed as site leader
- In some instances, veterinary nurses also act as CDs

If you have been promoted from a veterinary clinical role into clinical directorship, this can be daunting due to the breadth and number of areas and colleagues you now have authority over and responsibility for. In many ways, it feels much like your first week in practice. The challenge is knowing where to start and what to prioritize, and this of course is something you have to do alongside managing your own clinical case load.

It is therefore important to have a 'big picture' scope of what you need to deliver as well as which key performance metrics track (and represent) success. A CD's specific duties, tasks and responsibilities can be listed as four overarching objectives, and may include the following.

### CLINICAL CARE AND SERVICE

- Define, demonstrate and maintain clinical standards including hospitalized patients
- Conduct periodic clinical audits and act accordingly
- Apply policies, protocols and preferred products as determined by the group's clinical committee
- Achieve and comply with RCVS Practice Standards Scheme
- Ensure compliance with The Veterinary Medicines Regulations with respect to the acquisition, storage, prescribing and dispensing of veterinary medicines

### CLIENT CARE AND SERVICE

- Define, demonstrate and maintain client service standards
- Define, demonstrate and maintain communication systems to ensure clients are given regular and accurate updates about their pets and accounts

- Ensure that all client complaints are handled sensitively and in accordance with the Complaints Policy
- Ensure the practice complies with current GDPR/Data Protection Legislation
- Promote the business in accordance with the group's marketing guidelines

### DRIVING THE INCOME AND MANAGING THE PROFITABILITY OF THE PRACTICE

- Awareness of the practice's budget and business plan with respect to achieving turnover and profit targets
- Implement and adhere to pricing policies
- Conduct periodic charging audits and act accordingly
- Ensure cash management and banking policies are adhered to
- Promote the business in accordance with the group's marketing guidelines

### OVERSEEING THE GROWTH, DEVELOPMENT, MOTIVATION, MORALE AND WELL-BEING OF THE STAFF

- Recruit, manage and discipline staff in accordance with corporate policies and procedures
- Ensure that staff are given appropriate leadership, guidance, development and appraisal
- Ensure staff are aware of and adhere to health and safety policies
- Record HR and personnel matters
- Appraise and review pay of all staff in accordance with policy
- Ensure vets and nurses complete and comply with continuing professional development (CPD) requirements

### KEY LEARNING OBJECTIVES

- The meaning of the role clinical director
- Ways to becoming a clinical director
- Duties of a clinical director

### MULTIPLE CHOICE QUESTIONS

1. Which of the following is TRUE?
  - (A) Being a CD means only being responsible for the practice's controlled drugs records
  - (B) Being a CD means only being responsible for the practice's clinical governance
  - (C) Being a CD means you don't report to anyone else
  - (D) Being a CD is an excellent stepping stone from clinical work to practice ownership
2. Which of the following is FALSE?
  - (A) Only veterinary surgeons can be CDs
  - (B) CDs are usually responsible for overseeing client service standards



- (C) CDs are usually responsible for overseeing clinical care standards
  - (D) CDs are usually responsible for overseeing the financial performance of the practice
3. Which of the following is the most relevant to veterinary practice?

- (A) CDs should have a MBA
- (B) CDs need ongoing non-clinical CPD
- (C) CDs should have a post-graduate certificate in an area of clinical study
- (D) CDs are obsolete nowadays as a way of purchasing music



## Section V

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# Management streams

Friday 5 April

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Friday 5 April  
Hyatt Ballroom

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# New to management

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- 298 08:30–09:15  
**Internal marketing**  
Stacey Davidson
- 298 09:25–10:10  
**External marketing**  
Richard Casey
- 299 11:05–11:50  
**Understanding financial basics**  
Georgina Hills
- 300 12:00–12:45  
**How practice finances work**  
Miles Russell
- 301 14:05–14:50  
**Team development**  
Renay Rickard
- 301 15:00–15:45  
**Getting the best out of clinical workflow**  
Gillian Page
- 302 16:50–17:35  
**Crisis, what crisis?**  
Julie Beacham

## Internal marketing

Stacey Davidson

Workplace culture sounds mysterious and intangible doesn't it? In many ways it is difficult to define, but it surrounds us all the time, and has a daily impact on our working lives.

Workplace culture is made up of the values, beliefs, mission, ethics, attitudes and behaviours shared by a group of people and helps us to create unwritten rules on how to work together. Very simply put, 'it is the way we do things around here'.

When we go to work, we want to be around people who understand us, believe what we believe and who are trying to achieve the same things that we are striving for. But how do we know that we are aligned?

It all starts with communication and demonstrating genuine care for the people in our teams. By communicating our values, mission, ethics and attitudes throughout the organization, we can create clarity around our expectations for our workplace culture. By articulating our, hopefully, shared vision, we can create authenticity, understanding and transparency throughout our organization.

As managers and leaders, we need to start by understanding our current culture. We also need to have a clear vision of what we want our culture to be. What are the behaviours that we want to demonstrate consistently and that are authentic to our culture? And then how do we start to create the culture that we want?

In this session, we will explore the underpinnings of a resilient workplace culture which include:

- Ensuring our workplace and team-member behaviours reflect our mission and values
- Sharing successes, failures and challenges with our teams
- Prioritizing the well-being of every teammember
- Recognizing, rewarding and appreciating the valuable contributions of teammembers
- Creating a just culture in practice – a culture of trust and proactive learning, centred on understanding why

- Supporting a growth mindset where teammembers are encouraged to advance, develop and learn from failure
- Creating an environment of feedback and learning

### KEY LEARNING OBJECTIVES

- What do we mean when we use the term workplace culture?
- The roles that trust and authenticity play in workplace culture
- Identifying your own current workplace culture

### MULTIPLE CHOICE QUESTIONS

1. What are the benefits of a positive workplace culture?
  - (A) Elevated team enthusiasm and better productivity
  - (B) Teams that thrive
  - (C) Increased organization performance
  - (D) All of the above
2. What is the best way to establish and maintain core values?
  - (A) Document your organization's core values and talk about them (all the time!)
  - (B) Don't have too many and keep them simple; they need to be top-of-mind
  - (C) Create core values that mean something to the organization, even if that means being unconventional
  - (D) All of the above
3. What are the hallmarks of a resilient workplace culture?
  - (A) A culture that reflects the organization's mission and values
  - (B) An environment that supports a growth mindset
  - (C) Prioritization of well-being
  - (D) All of the above

## External marketing

Richard Casey

Practice management is truly a multidisciplinary role. One minute you can be arranging equipment maintenance, recruiting for a new team member, dealing with a complaint and the next, you need to develop a new marketing strategy to increase client numbers. But what if you're not a marketing expert and the word strategy alone sends shivers down your spine? This needn't be the case. Remember strategy is just another word for plan and in

this lecture we'll explore a simple and straightforward method for developing a marketing plan for your practice that's aligned to the world you're working in and what you want to achieve.

Taking time to capture your current situation can help inform your short- and long-term plans. So we'll start our lecture by exploring ways to understand what's happening within your practice, as well as the immediate and wider external environment. This exercise will help you to define clear objectives for your plan from which we can create strategies and tactics to achieve them. We'll end with some basic action plan and control techniques to ensure you keep on track and achieve what you set out to. By the end of the session you'll

understand how you can approach answering the following questions:

- What environment is my practice operating in?
- What do we want to achieve in the short/long term?
- What is my practice's position in the market place?
- Who are our target clients?
- What are the best ways to get our message to our target clients?
- What steps do we need to take and when, to achieve our objectives?
- How will we know if we've achieved what we set out to do?

### KEY LEARNING OBJECTIVES

- Describe the SOSTAC® approach to marketing planning
- List various tools and models to use when developing a marketing plan
- Describe ways to involve your practice team in developing your marketing plan

### MULTIPLE CHOICE QUESTIONS

1. What do the two S's in SOSTAC stand for?
  - (A) Situation and significance
  - (B) Sales and strategy
  - (C) Situation and strategy
  - (D) Send and sales
2. What will your marketing mix include?
  - (A) How you will communicate your services to your target audience
  - (B) A list of competitors
  - (C) Timelines of what you're going to do and when
  - (D) Key performance indicators of your marketing plan
3. The 7Ps of marketing are useful when developing which stage of your marketing plan?
  - (A) Situation
  - (B) Objectives
  - (C) Control
  - (D) Tactics

## Understanding financial basics

### Georgina Hills

Often when new to a management role one of the biggest challenges is the understanding and the effective use of the monthly reports you receive. Rather than just putting them in a large file on the shelf, they should be used to understand the health of your business and help make decisions and plan forwards. Much as taking a TPR monitors the health of your patient, the profit and loss report and key performance indicators (KPIs) do the same for your business.

The first item to understand is the difference between management accounting and financial accounting. Management accounting is the set of reports a manager uses to inform themselves about the business performance and to make decisions. The financial accounting (yearend) reports focus on financial transactions, analysis and summaries which are built into a financial statement for public consumption.

Management accounting reports include:

- Profit and loss
- Balance sheet
- Cash flow report
- Budget/forecast
- Debtors
- KPIs

As a manager involved in the day-to-day running of a business and needing to make real-time decisions and plans, understanding of the profit and loss report and KPIs can have a significant impact on the decisions you make. The difference between informed decisions and guessing.

The profit and loss account or report shows the income generated and the amount of income left after costs and running expenses are deducted for a fixed period of time, usually generated as a monthly report. Selecting the right KPIs to monitor alongside the profit and loss will help inform on key factors crucial to the business success and enable the recognition of trends which can be responded to with relevant decisions. From these reports you will be able to understand how your business is performing and plan ahead.

### KEY LEARNING OBJECTIVES

- Understand how to read a profit and loss report
- Which key performance indicators will help understanding of the business
- How to use management reports to make informed business decisions?

### MULTIPLE CHOICE QUESTIONS

1. In a profit and loss report what does the term sales/revenue refer to?
  - (A) The payments received in a given period
  - (B) The invoices generated including VAT but not any payment/health schemes

# New to management

- (C) The invoices generated without VAT (net) and any payment/health schemes income
  - (D) The invoices generated in a given period including VAT that have been paid
2. What does the term EBITDA stand for?
- (A) Earnings before interest, tax, depreciation and amortization
  - (B) Earnings before interest, tax, discounts and amortization

- (C) Earnings before inspection, tax, depreciation and amortization
  - (D) Earnings before inspection, tax, discounts and amortization
3. Which of the following reports shows what a business owns, owes and is owed?
- (A) Debtors report
  - (B) Cash flow report
  - (C) Budget/forecast report
  - (D) Balance sheet

## How practice finances work

### Miles Russell

To be profitable, income needs to be more than expenditure. This lecture will discuss how to achieve this in veterinary business.

#### INCOME

- Sorts of income, e.g. service and drug income, and how to set prices
- How to measure income performance with key performance indicators (KPIs) and regular monthly figures
- How to maximize income but give clients good value for money as well, by charging correctly and getting the cash in for work done

#### EXPENDITURE

- What makes up the cost of a veterinary practice and how to ensure you get best value from costs and that expenditure does not outstrip income
- Drugs – most drugs come from a wholesaler with a professional price list, so it is helpful to know how to get the best price and not be fooled by the 'smoke and mirrors' of drug company retro and discounts policies
- Consumables – about balancing quality to price. This area will not make or break a business but adds a small amount to the bottom line
- Laboratory costs – negotiation of contract is important but also ensuring all lab fees are charged
- Wages – largest fixed cost for any veterinary practice and one that you can control, but it is also determined by market. Getting the most out of staff is key to a good return on staff
- Motoring expenses – not a significant cost to small animal practice, a fixed cost. There are a few cost-saving methods, checking service charges, possible use of fuel cards, different capital purchasing options
- Overheads – overhead control needs to be done as good income generation can be whittled away by

overspend on overheads. The lecture will talk about cost control through regular reviewing of contracts

- Challenging suppliers on costs but not always going for lowest cost by looking at best value and what suits the practice

#### FINANCE

The lecture will discuss finance options, how to get finance and how to control it.

#### FIGURES

Finally, the lecture will discuss the importance of monthly figures and what these are made up of and who should see them.

#### KEY LEARNING OBJECTIVES

- Measurement of income and charging correctly
- Drug purchasing, discount and retro payment are unseen income
- Regular review of figures

#### MULTIPLE CHOICE QUESTIONS

1. Below what should your practice's percentage of non-discountable items purchased from a wholesaler be?
  - (A) 10%
  - (B) 2.5%
  - (C) 5%
  - (D) 7.5%
2. What do you consider to be a good gross margin percentage for small practice?
  - (A) 70%
  - (B) 80%
  - (C) 65%
  - (D) 75%
3. How often should the veterinary team see KPIs?
  - (A) Monthly
  - (B) Quarterly
  - (C) 6-monthly
  - (D) Yearly



# Team development

**Renay Rickard**

This will be a practical approach for the new manager or leader as to the benefits of developing your team effectively. These benefits affect all stakeholders within a veterinary business – the individual team member, the practice team, the leader/manager, the employer/veterinary business, clients and patients, and therefore we will be discussing why team development should be a priority for any leader or manager.

In an industry that is facing challenges to recruit and retain members of the profession, this is an area that is very important to any member of the practice team. Development is not just about fulfilling your obligations to remain a registered professional, but it is about progressing through your chosen career path as a well rounded, confident and competent person. A team or individual will soon become demoralized and demotivated if they feel they are not progressing or learning and are starting to stagnate. A common stress factor is a person who feels out of control within a certain environment or that they have no clear plan. An effective team leader will show an active interest in the progression of their team and will support and encourage this. We will be looking at the ways as leaders we can do this – whilst also ensuring our own development strategies.

## KEY LEARNING OBJECTIVES

- Identifying why you should develop your team effectively and who benefits from this
- How to communicate with your team effectively and how to engage team members in their individual and their team development
- How to progress with a team-development strategy and culture

## MULTIPLE CHOICE QUESTIONS

1. What is the indication that your team is not well developed?
  - (A) Adaptable to change
  - (B) High morale
  - (C) Diminishing skill set
  - (D) Low staff turnover
2. Which is the key to your team engaging with their development?
  - (A) Higher pay
  - (B) Seeing the benefits and being part of the process
  - (C) Better holiday allowance
  - (D) More profitable business
3. Who is involved in the development culture of a business?
  - (A) Directors/owners of a business
  - (B) The clinical and customer team
  - (C) RCVS
  - (D) All of the above

# Getting the best out of clinical workflow

**Gillian Page**

At a time when it's a challenge to plan and sustain the future veterinary surgeon and veterinary nurse workforce, the veterinary market is more competitive and with over 50% of practices showing little or no profit, addressing workflow in practice could help to ease individual stress, increase staff well-being (aiding retention), increase client confidence and have the desired result of improved clinical outcome, business performance and increased profit.

In 2015, the BVA & RCVS launched Vet Futures & VN Futures, an action plan with the aim of 'a profession fit to face the future'. Ambitions include:

- 'Thriving, innovative, user-focused businesses'
- 'Structured and rewarding career paths' for veterinary nurses

- 'Maximizing nurses' potential'

It is vital that veterinary practices have a sustainable, profitable future so that they can care for and protect the health and welfare of animals.

In 2018, the BVA expressed concern over a survey demonstrating more than half of responding veterinary practices had below average profitability, while 15% generated 'a negative value for net profit'.

To meet the increasing complexity of today's ever-changing veterinary environment, progressive business models can be adopted and flow of work should be a primary consideration.

## WHAT IS CLINICAL WORKFLOW?

- Flow: the action of moving along steadily and continuously in a stream
- Workflow: process involving a series of tasks (events or interactions). How the tasks are accomplished, in what order, and by whom
- Clinical workflow: the delivery of clinical services

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## BENEFITS AND OUTCOMES OF WELL MANAGED CLINICAL WORKFLOW

### Patient

- Enhances healthcare quality and safety, reduces errors
- Improves co-ordination of care and clinical outcome

### Client

- Better clinical outcome for pet
- Reduced waiting times
- Improved patient welfare leads to increased client satisfaction
- Confidence in profession

### Veterinary team

- Growth of individuals through tasks given
- Reduces stress by removal of practice chaos
- Happier veterinary team improves mental well-being
- Retention of staff
- Professional confidence

### Financial

- Maximize efficiencies – more efficient practice, higher caseload it can accommodate
- Retention of staff reduces advertising and interview costs
- No need for additional veterinary salary if tasks undertaken by growth of capable veterinary nurses
- Satisfied clients – encourages increased footfall
- Increased profit margins

## IMPLEMENTING CLINICAL WORKFLOW

- Starts before the client and patient arrive at the front door of the practice
- Consider patient journey; begin at the front door and work through to the end of that journey back out through the door
- Considerations include: who to communicate with, who does what, how, when will that happen, where

will that happen, what are the protocols to consider and what administrative records need to be completed?

## KEY LEARNING OBJECTIVES

- Understand the term 'clinical workflow' and the relationship to patient care and practice profitability
- Demonstrate an understanding of the clinical decision-making requirements of workflow, including who, what, when, how and information needed
- Identify the consequences of suboptimal clinical workflow in the delivery and outcome of patient care

## MULTIPLE CHOICE QUESTIONS

1. A busy veterinary team has no time to maintain an agreed clinical workflow, patients need to be seen. What is your approach to getting the team onboard?  
(A) Cancel consultations  
(B) Reschedule clients  
(C) Find additional cover  
(D) Block time out in advance
2. Lack of time, vision and communication skills are examples of leadership failures that damage the implementation of a successful clinical workflow. What could be introduced to help limit this?  
(A) Have a mission statement, long-term strategy and clinical governance  
(B) Accept it can be difficult  
(C) Hire a head veterinary nurse to ensure compliance  
(D) Have a self-review with each team member
3. Which of the following leadership qualities would be most important for senior team members to display when implementing a clinical workflow?  
(A) Charismatic (C) Supportive  
(B) Task-oriented (D) Driven

## Crisis, what crisis?

### Julie Beacham

One important aspect of management is dealing with the inevitable problems that arise and making decisions quickly under pressure. The key to doing that well is training, preparation and having essential information to hand. As a new manager you must establish the boundaries of your role, lines of authority and knowing who to ask for help when unsure. Have that conversation and prepare before something happens.

Veterinary practices are complex environments and things will go wrong. Problems can be patient related, people focused (clients and team), equipment failures or emergencies affecting the premises such as fire and power failures. A combination of reference documents, standard operating procedures (SOPs) and some simple business continuity planning will enable you and the practice team to cope with all eventualities. Compliance with legislation will also put much of this in place. Fire safety is one area where the requirements of the legislation give the team the procedures, training and knowledge to cope.

People problems require careful handling and a cautious approach, particularly where client complaints

or employment law issues are concerned. It is always safest to acknowledge any upset, take full details of the problem and promise to investigate before providing a date by which a full response will be received. This gives you time to think, take advice and achieve the best outcome for the person and the practice. External providers of this advice will include your professional indemnity insurers, HR advisors or ACAS. Poor communication is the main cause of complaints.

Dealing with premises and equipment problems is made much easier by establishing a network of trusted local suppliers who know you and your business. These will include a handyman for general repairs, plumber, electrician and IT support person. They should spend time familiarizing themselves with your system and premises before problems occur to enable them to respond quickly in an emergency. A list of contact numbers with key details, such as the location of the mains water stopcock and gas and electricity connections into the building, is a vital reference document for the practice team.

Equipment failures are sadly inevitable but building good relationships with suppliers will often make them willing to help out with loan machines or speedy repairs when items break down. Alternatively, neighbouring practices may be willing to help out. Regular servicing and maintenance and keeping a stock of spares such as bulbs and batteries will minimize downtime. Contact details for your key companies should be readily accessible together with SOPs for IT failures and power cuts to allow the practice to function until the supply is restored. Being prepared involves making up document packs for each consulting room and a supply of torches.

Dealing with problems is stressful for new managers but having a useful general approach to dramas large and small will enable you to keep calm and carry on. I will detail this during the session and take you from the

first step – communication – to the last, which is always to review.

## KEY LEARNING OBJECTIVES

- How to be prepared for managing problems in veterinary practice
- Collating the essential information and resources and writing a simple business continuity plan
- Developing confidence in your abilities and reducing your stress levels by preparing and planning

## MULTIPLE CHOICE QUESTIONS

1. What is the main cause of complaints in veterinary practice?  
(A) Cost  
(B) Clinical outcome  
(C) Communication  
(D) Out of hours' provision
2. Which of these are the key pieces of information for your team?  
(A) Contact numbers for contractors and equipment suppliers  
(B) Location of mains water, gas and electricity supplies to the building  
(C) SOPs for power and IT failures  
(D) All of the above
3. What is the essential last step when things go wrong?  
(A) Review  
(B) Retire  
(C) Rewind  
(D) Restart



## Section V

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# Management streams

Saturday 6 April

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Saturday 6 April  
Hall 7

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# Key Skill Focus: Effective communication

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- 308 08:30–09:15  
**You're different from me: four communication styles**  
Alan Robinson
- 308 09:25–10:10  
**Meetings, meetings: make them work**  
Alan Robinson
- 309 11:05–11:50  
**When they say 'No': managing expectations**  
Alan Robinson
- 310 12:00–12:45  
**Could do better: managing high performers**  
Alan Robinson
- 311 14:05–14:50  
**All together now: creating team dynamics**  
Alan Robinson
- 312 15:00–15:45  
**Five signs of a high performance team**  
Alan Robinson
- 313 16:50–17:35  
**Yes, please: improving client compliance**  
Alan Robinson
- 314 17:45–18:30  
**Difficult client or difficult communication?**  
Alan Robinson

## Key Skill Focus: Effective communication

### You're different from me: four communication styles

**Alan Robinson**

In our work in veterinary practice our minds are constantly absorbing information from all sides. To manage this information, we filter it in a variety of ways, allowing us to make meaning of what we see, hear and feel. The filters help us focus our attention on what seems to be important, screening out what seems unimportant or might confuse.

There are many filters, some of which have been identified in recent years by neurolinguistic programming, often demonstrated by the language patterns and behaviours we choose. Talent Dynamics profiling draws on these recent developments as well as on an understanding of human behaviour from the fields of neurology, psychology and philosophy. We describe these energies as Dynamo, Blaze, Tempo and Steel.

All of us at times can be cool and objective; all of us have feelings and emotions. We can be goal-oriented and logical, and also illogical, intuitive and inexplicable. Talent Dynamics profiling explores these four types of thinking in more detail, showing how being rational, dependable, instinctive and curious all have their place in creating success.

Most of us choose to use one or two filters more often than the others. Our choices may be influenced by our history – what made us successful as we were learning to make our way in the world or what our parents and teachers thought important. Our current context may also affect our choices – the demands of our job and what we need for success now. And a third determining factor may be our relationships – making room for the thinking styles of partners or colleagues or compensating for a missing approach.

Our chosen filters may vary according to context, but there will probably be some activities or approaches we value more than others. The ideal is more choice and flexibility. It is not to be equal in all thinking styles, but to develop flexibility in our behaviour and approach, so that

in each situation with clients and team members we can choose which filters are the most appropriate to give us the result we are looking for. Enjoy trying some new approaches and rediscovering your genius!

#### KEY LEARNING OBJECTIVES

- An overview of the different energies and thinking styles and the values and behaviours that are important in each thinking style
- A self-assessment of your current thinking style and some questions to ask about how you operate now
- How to work and communicate with others by understanding their thinking style

#### MULTIPLE CHOICE QUESTIONS

1. You typically like to work with facts and figures, like systems and processes and are good at maintaining stability. Your Talent Dynamics profile energy is likely to be high in which of the following?  
(A) Dynamo (C) Tempo  
(B) Blaze (D) Steel
2. You work with someone who is very creative, always coming up with great ideas and starting projects, but not always good at finishing them. Their Talent Dynamics profile energy is likely to be high in which of the following?  
(A) Dynamo (C) Tempo  
(B) Blaze (D) Steel
3. One of your veterinary surgeons is very analytical, has a specialist field of expertise and works very well on their own improving the process and outcomes, but may be limited by a sense of perfectionism and working with others effectively. Their Talent Dynamics profile energies are likely to be high in which of the following?  
(A) Dynamo and Tempo  
(B) Blaze and Steel  
(C) Tempo and Blaze  
(D) Steel and Dynamo

### Meetings, meetings: make them work

**Alan Robinson**

Meetings can be either a time-consuming waste or they can be a huge benefit to the organization if run correctly, such as:

- Developing a strong team working together for a common goal

- Resolving issues
- Making improvements
- Educating team members
- Resolving indifference between team members
- Helping the business to run more smoothly and more efficiently
- Ensuring people know what to do, when to do it and being accountable for particular tasks

For meetings to realize the benefits above they need to have some rules around them. They also need to have structure and purpose, and everyone needs to understand these rules, the structure and the purpose of each meeting.



## TEAM MEETINGS

Team meeting can be held each week or fortnight at the same time, say 12.00 pm each second Monday over the lunch period. Everyone is to attend these meetings if at all possible. These meetings are to have a purpose. The main benefit of a team meeting is to have the team working towards a unified objective or goal. This strengthens the team dynamic and helps the team work more closely and in harmony towards the common goal. However firstly, we need to establish what the common goal is.

### Business goal and vision

In most businesses, the business owner or manager decides what the goals of the business are and then rarely communicates this with his or her team. However, even when this goal is communicated, the team are not committed to it. Why? Because they had no input into it. People will always participate more actively in something that they had some input into developing. Therefore, it is important that everyone is involved in developing the organizational goals and vision.

### Continuous improvement

The next step of your journey is to build a sustainable way to have the team continually improve the processes (the way things are done) within the business. A way where everyone in the whole team can each identify problems or opportunities to help reach the vision and become a learning, continually improving business, and where the team can work together to come up with resolutions and better ways of doing things. This needs to be effective and time efficient; once the system is up and running it will only take 15–30 minutes a week.

Please note that the continuous improvement system should be launched and be up and running effectively before introducing and working through purpose, shared vision, 'rules to live by' and the client journey.

## THE EXECUTIVE TEAM MEETINGS

These meetings are purely to discuss direction and to make management decisions on things like major spending, business direction etc. These are strategy meetings

and operational matters should not be discussed. It is suggested that these meeting occur monthly soon after the end of the month, so the prior month can be discussed, as well as matters coming up in the month to come.

## KEY LEARNING OBJECTIVES

- How to structure efficient and effective team meetings to fit into practice schedules
- Understand the rules of effective meetings
- The three key meetings for strategy implementation: executive team, functional team and continuous improvement meetings

## MULTIPLE CHOICE QUESTIONS

1. Which one of these is not necessary as a team meeting rule?
  - (A) Meetings start and finish when everything has been discussed
  - (B) Get rid of distractions
  - (C) Focus on the problem/solution – not the people
  - (D) Clarify action points, decisions and outcomes
2. Why do team meetings often fail or become a waste of time?
  - (A) There is no clear agenda or outcome
  - (B) Actions decided are not followed up on
  - (C) They are over ruled by one individual and others do not or cannot contribute
  - (D) All of the above
3. Which one is false about continuous improvement meetings?
  - (A) They should run at least every 2 weeks to be effective
  - (B) Should run no more than 30 minutes
  - (C) Should attempt to solve all the problems in the meeting
  - (D) Should involve and have input from all team members

# When they say 'No': managing expectations

## Alan Robinson

Not all team members want to comply with your instructions and may resist actively or passively. Either way there is always a communication mismatch that you need to address. Here is a model for G.R.E.A.T. communication.

1. Write a behavioural description of the problem. Take out all the emotional and judgemental language that normally accompanies your reaction to their behaviour

2. Before your meeting decide how you plan to approach each element of G-R-E-A-T:
  - Goals. What is the behavioural goal or goals you would like to achieve? How would things be different if you got the change you wanted? What are the reasons you want or need to achieve these goals?
  - Roles. What are the roles you want to play and have the other person play in your work situation? (Check that they are defined in behavioural terms.)
  - Expectations. What are your expectations for satisfactory performance? For outstanding performance? Have expectations changed from previous situations? How do you expect to be treated? How do you expect a good employee to act when there is a problem?

# Key Skill Focus: Effective communication

- Abilities. Is the problem a 'don't know', 'can't do' or 'won't do'? (always assume it's a 'don't know' first, then escalate – you'll be more successful that way)
  - Don't Know. How can I best give the information or instruction in behavioural terms?
  - Can't Do. Could the employee do the job for £1 Million? If not, it's a 'can't do' problem. What steps could you take to help the employee become more able to do the job: training, changes in job structure, tools and resources, reassignment
  - Won't Do. What are the rewards and punishments (from the team member's point of view) for refusing to do the job the way it needs to be done? Performance is punished (list negative consequences of doing the job correctly); failure is rewarded (list positive consequences of not doing the job correctly); performance doesn't matter (Why not? Lack of reward or sanctions?) Maybe there are ways you can change the rewards and punishments to achieve the desired behavioural change
- Time: What is your timetable? Is this an 'instant change' situation or one calling for gradual, steady improvement? What support will you provide? How will you measure progress toward the goal?

## WHEN WILL YOU FOLLOW UP?

- What actions will they take?
- What actions will you take?
- What is the timescale for change and/or completion?
- How will you measure it?
- What are the consequences both positive and negative
- Plan regular follow-ups
- Write it down and agree

## REASONS FOR FAILURE

Ask yourself, 'Have I...'

- Failed to anticipate the employee's reaction to feedback?
- Put too much emphasis on why the employee's performance is decreasing?
- Failed to analyse the employee's performance in concrete terms?

- Failed to spend time on what the employee is doing correctly?
- Failed to follow-up?

## KEY LEARNING OBJECTIVES

- How to observe others behaviour more objectively and understand how communication mismatches result in conflict
- Develop a method of managing conflict with team members to get changes in behaviour and improved performance
- Understand how to set expectations with team members that are clear and can be complied with

## MULTIPLE CHOICE QUESTIONS

1. In dealing with poor behaviour in a team member, what would the first step be?
  - (A) Decide that they are to blame and tell them immediately
  - (B) Threaten them with punishment as soon as possible
  - (C) Say nothing so they can get into further trouble
  - (D) Think about the incident and record the actual behaviour without the emotion and judgement
2. Which two communication styles would typically struggle the most to see each other's points of view?
  - (A) Blaze and Tempo
  - (B) Dynamo and Steel
  - (C) Steel and Blaze
  - (D) Tempo and Steel
3. Which of these is NOT good practice when setting expectations with team members?
  - (A) Establishing a few specific goals that are clearly understood
  - (B) Not assigning clear one-person accountability for each key goal
  - (C) Requiring a plan for how and when the goals will be achieved
  - (D) Stating goals in ways that are definable or measurable

## Could do better: managing high performers

Alan Robinson

No matter how elegant the strategy, vision and values you still have to look at the results occasionally. Your

team are ultimately responsible for the business outcomes and your veterinary surgeons are particularly responsible for financial and clinical outcomes. These are your top performers. Key performance indicators are simply the goals and outcomes you wish them to achieve in a set time.

It is the job of the practice owners or leadership team to set the vision and direction of the practice. This can be done using tools such as SWOT and PEST analysis, Vision Orbits etc. Then decide which are the top three areas from your Vision Orbit, that if you could just crack these three in the next 3 months they would give you the

greatest breakthroughs in your life and the practice. We would recommend that these become the three main objectives for the year that will guide your practice and the team.

Your team members then check to see what they are responsible for and the three WHATs they need to achieve to make this happen. That doesn't mean you won't also be working on the other areas as well, but if time is limited, these are the three areas to keep your focus firmly on.

Then for the period from now until the end of 90 days from now decide on three supporting HOWs or process goals for each WHAT (outcome goal) project you have. Make them clear, concise and in SMART format: specific, measurable, achievable, realistic and time dependent.

## TIPS FOR POWERFUL GOALS

Start each goal with a strong, active verb such as earn, arrange, complete, ensure, choose, train, etc. Decide whether to express the goal as a results goal (WHATs) or a process goal (HOWs). Examples include:

- Results goal: achieve turnover per vet of £320,000 per year on average for the next 90 days. Process goal: have understood and used the new pricelist and structure by end of September
- Results goal: improve C2:C1 ratio to 80% over next 3 months. Process goal: review opportunities for follow-up consultations and book within 48 hours
- Results goal: improve communication and engagement of the clinical team. Process goal: hold monthly team meetings informing them of progress and working out protocols

## KEY LEARNING OBJECTIVES

- Designing key performance indicators for teams and individuals
- Setting outcome goals and process goals
- Examples of outcome and process goals

## MULTIPLE CHOICE QUESTIONS

1. The vision and strategy of the business should be set by, and agreed by which of the following?
  - (A) The owners of the business
  - (B) The departmental managers in charge of business functions
  - (C) All the employed staff
  - (D) All of the above
2. Goals set for key performance indicators should be which of the following?
  - (A) Specific and measurable
  - (B) Achievable and time dependent
  - (C) Individual and managed
  - (D) Realistic and achievable
3. Process goals are NOT which of the following?
  - (A) Better if they start with a strong verb such as earn, arrange, meet
  - (B) Clear outcomes of what you are trying to achieve
  - (C) Milestones or actions that show how you are progressing towards a specific goal
  - (D) Helpful in maintaining motivation and direction for high performers

# All together now: creating team dynamics

## Alan Robinson

Some practices have great teams, all pulling in the same direction, happy and motivated, whilst others haemorrhage staff members, have massive recruitment costs and there's no feeling of 'we love coming to work' around the place. What is the difference in these businesses, and do the good ones always know how they made that happen?

Successful practices have successful teams working together for a common goal and common purpose. Owners often get stuck in the clinical/management dilemma of having a full-time clinical role and then having to manage the spare-time management role. The only way through this is to develop an autonomous and self-directed team to take on some of the management and leadership responsibilities of the practice. So where do we start in building a successful team?

For teams to work together, with divergent needs and outcomes, there need to be two essential elements in place:

- A clear and powerful vision of where the practice is going that is shared and understood across the team. Also, the team needs to have had some input into the vision. If they don't write the plan they will fight the plan. Often practice owners, particularly veterinary surgeons, struggle to articulate and define the big-picture thinking of crafting a vision – some don't even know what that means. Others struggle to get their teams involved or fear the consequences of asking for team feedback. Often some facilitated help is needed at this stage
- If the team is going to be expected to act and make decisions they need some clear guidelines for action and decision making that the owners can trust. These guidelines are based on a set of shared values that guide behaviour and 'the rules to live by'. Again, this can appear as 'soft' management skills and often others in the practice are better placed to elicit and develop these ideas. A fundamental principle here is the idea of the owner letting go of control (scary)

There are some key processes and structures that need to be in place if the process is to be sustainable. Often these initiatives fall away within months because of the lack of effective underpinning systems.

The vision will provide the direction, or 'the sky above', and the values provide the 'ground beneath

# Key Skill Focus: Effective communication

our feet' for the team to find autonomy, motivation and improve performance at all levels and provide the framework within which the practice can succeed.

This talk will take practice owners and managers through the process and tools of creating a shared vision and values of a successful team.

## KEY LEARNING OBJECTIVES

- The two essential elements of a successful practice team – vision and values
- How to craft a strong vision the team can engage with
- How to create a set of shared values that guide behaviour

## MULTIPLE CHOICE QUESTIONS

1. What is the practice vision a statement of?  
(A) The future reality of the practice as life should be to engage all the team  
(B) The business plan

- (C) A list of goals to be achieved in the next few years  
(D) A list of all the practice achievements in the last year
2. What are the practice values?  
(A) Protocols to be used when dealing with clients  
(B) How much the practice is worth  
(C) A set of agreed attributes that drive the culture and behaviour of all team members  
(D) A set of rules to follow blindly to maintain consistency
3. What are team engagement and motivation driven by?  
(A) Strict rules and protocols dictating behaviour  
(B) An intrinsic sense of legacy, autonomy and mastery  
(C) Extrinsic rewards such as bonuses, money and time off  
(D) Removing all stress and pressure to perform well

## Five signs of a high performance team

Alan Robinson

### HIGH PERFORMANCE SIGN 1: TRUST AND FLOW

Trust lies at the heart of a functioning, cohesive team. Without it, teamwork is impossible. Essentially, this stems from willingness to be vulnerable within the group and understanding each other's strengths and weaknesses.

Suggestions:

- Personal history exercise
- Personality and behavioral profiles
- 360-degree feedback

The role of the leader:

- Demonstrate vulnerability first
- Create an environment that does not punish vulnerability
- Vulnerability must be genuine, not staged

### HIGH PERFORMANCE SIGN 2: MANAGEMENT OF CONFLICT

All great relationships require productive conflict in order to grow. Teams that lack trust are incapable of engaging in unfiltered and passionate debate of ideas. Instead, they resort to veiled discussions and guarded comments. All people have different contributions and perspectives on any subject. Understanding when and where those perspectives are useful improves the innovation process.

Suggestions:

- Mining: someone who extracts 'buried' disagreements and exposes them
- Real-time permission: being uncomfortable is OK!
- Assessment tools

The role of the leader:

- Demonstrate restraint when people engage in conflict
- Allow resolution to occur naturally
- Model conflict behaviour

### HIGH PERFORMANCE SIGN 3: HIGH COMMITMENT

Great teams make clear and timely decisions and move forward with complete buy-in from every member of the team, even those who voted against the decision. This is accomplished through the airing of opinions in the course of passionate and open debate.

Suggestions:

- Cascading messaging: review key decisions made to be communicated consistently throughout the organization
- Clear and honoured deadlines
- Contingency and worst-case scenario analysis
- Low-risk exposure therapy

The role of the leader:

- Willingness to be wrong
- Constantly pushing the group for closure around issues
- DO NOT place a premium on certainty or consensus

## HIGH PERFORMANCE SIGN 4: ACCOUNTABILITY AND AUTONOMY

Without committing to a clear plan of action, even the most focused and driven people often hesitate to call their peers on actions and behaviours that seem counterproductive to the good of the team. The clearer the plan and the more input the team have the more accountability you create. If the team don't write the plan, they fight the plan.

Suggestions:

- Publications of 1-year and 90-day goals and standards
- Simple and regular progress reviews
- Team rewards

The role of the leader:

- Allow the team to serve as the first and primary accountability mechanism
- Willingness to serve as the ultimate arbiter of discipline when the team fails itself

## HIGH PERFORMANCE SIGN 5: ATTENTION TO RESULTS

An unrelenting focus on specific objectives and clearly defined outcomes is a requirement for any team that judges itself on performance. Inattention to results occurs when team members put their individual needs or even the needs of their 'divisions' above the collective goals of the team. Clear and timely dashboarding of practice, branch and individual metrics that are focused on the progress and completion of goals is required.

Suggestions:

- Public declaration of results
- Results-based rewards

The role of the leader:

- Set the tone for a focus on results

- Selfless and objective: reserving rewards and recognition for those who make real contributions to the achievement of group goals

## KEY LEARNING OBJECTIVES

- Understand the five drivers of a high-performing team
- Learn some tools to create high-performing teams
- Understand the role of the leader in a high-performing team

## MULTIPLE CHOICE QUESTIONS

1. What is the first requirement of a high-performing team?
  - (A) Accountability and autonomy
  - (B) Attention to results
  - (C) Trust and flow
  - (D) Commitment
2. In managing conflict in a team which of the following can you use?
  - (A) Profiling tools to assess different people's perspectives
  - (B) Review key decisions consistently throughout the organization
  - (C) Clear and honoured deadlines
  - (D) All of the above
3. In managing commitment in a team a leader should not do which of the following?
  - (A) Show willingness to be wrong
  - (B) Constantly push the group for closure around issues
  - (C) Place a premium on certainty or consensus
  - (D) Answer five key questions in the decision process: why, what, who, when and how

# Yes, please: improving client compliance

## Alan Robinson

Managing client compliance is the secret to a high performing and profitable practice. High compliance means that you create more work and sales from far fewer clients. There are two areas to improve client compliance: preventative healthcare and clinical recommendations.

A well structured preventative healthcare plan takes advantage of all the opportunities available for preventative healthcare that the practice has to offer, including a regular comprehensive physical examination (health check), routine vaccinations, nutritional advice, parasite control, dental check-ups, regular weighing, neutering, pet health insurance and diagnostic tests as required. Once you have bonded clients, clinical compliance becomes much easier. However, in clinical care it is

important to understand and manage the clients' expectations – which are often different from the veterinary perception.

Poor clinical compliance from a veterinary perception is due to:

- Cost – the vet deciding that the treatment is too expensive, the client couldn't afford it or it might be rejected as expensive
- Communication/client education – usually giving too many options without a definitive recommendation or not explaining the benefit of the recommended treatment
- Client time/convenience – having to come back or scheduling at a time inconvenient to the client
- Perceived value – the client not seeing the value in regard to the prognosis of the case
- Process error at the clinic – failure in processing the booking or follow-up

Poor compliance from the clients' reality is due to:

- Lack of effective recommendation from the veterinary surgeon, therefore didn't know or confused about the options available or were given

# Key Skill Focus: Effective communication

too much information in a short time causing confusion and uncertainty:

- Ask open questions to gain clarity about the clients' understanding
- Differentiating the 'disease' (the pathology in the patient) from the 'illness' (addressing the emotional perceptions in the clients' mind)
- Need or benefit not explained as to why the procedure is necessary:
  - Clients want a prognosis! – not a diagnosis – explaining what the outcome is rather than what the problem is
- Lack of reinforcement by veterinary team – following systems and protocols to get to a resolution:
  - Use agreed consistent practice protocols – follow-up systems for all consultations

In any consultation communication mismatch there are consistent and costly missed opportunities:

- Discounting professional time – selling yourself at too low a rate and not charging for everything you do, giving it away
- Not listening to the client's concerns
- Failure to recommend treatment – not doing the work presented
- Failure to practice good protocols and not following up case work appropriately

To reduce this compliance gap in every consultation there needs to be a discussion of the four Cs:

- Clinical – what's the problem and process?
- Compliance – what we have to do next?
- Compassion – what are our concerns?
- Cost – what's it going to cost?

The space between the consultation room door and the reception desk is where clients and cash disappear ... at any time, someone in the practice holds the baton of the client. The baton has the 'four Cs' of information.

## KEY LEARNING OBJECTIVES

- The two key areas for improving client compliance are preventative work and clinical care
- Preventative compliance is best bundled into a preventative healthcare scheme
- Clinical compliance is down to managing the consultation process

## MULTIPLE CHOICE QUESTIONS

1. Which one of these is NOT a feature of a preventative healthcare plan?
  - (A) To improve the health of pets under care, leading to a better quality of life and greater longevity of the pet
  - (B) To get as many clients as possible having their pets vaccinated and buying products
  - (C) To provide a quality client service through better pet healthcare
  - (D) To enhance client bonding (repeat visits and taking up more products and services).
2. What are the missed opportunities from poor communication in the consultation?
  - (A) Discounting professional time – selling yourself at too low a rate and not charging for everything you do
  - (B) Not listening to the client's concerns
  - (C) Failure to recommend treatment – not doing the work presented
  - (D) All of the above
3. Which option is NOT one of the four Cs of consultation that need to be communicated?
  - (A) Clinical – what's the problem?
  - (B) Complexity – how difficult the treatment will be for the veterinary surgeon?
  - (C) Compassion – what are our concerns?
  - (D) Cost – what's it going to cost?

## Difficult client or difficult communication?

### Alan Robinson

Is it about difficult clients or is it about difficult COMMUNICATION?

Clarity of communication is about being clear in your own mind about what you want to communicate; delivering the message succinctly and ensuring that the message has been clearly and correctly understood. Good communication means saying what you mean – and fully comprehending any feedback. It is often said that we have failed to deliver client needs in these circumstances, however, in reality it's not about meeting client 'needs'; it's about meeting client expectations!

Creating expectations involves:

- Estimates, costs and updates

- Written instructions
- Client fact-sheets
- Clear practice procedures and protocols
- Staff consistency and communication

Delivering expectations requires:

- Staff consistency and communication
- Clear, comprehensive clinical notes
- Written instructions pre- and postoperative
- Client fact-sheets
- Clear practice procedures and protocols
- Ongoing client communication

Managing failed expectations requires:

- Acknowledge the problem
- Be polite
- Be patient and listen
- Restate the customer's complaint for accuracy
- Let the client steam!!

Resolving client complaints requires time and energy and someone trained and empathetic to client emotion as well as their own. They need to stay detached, stay



focused, be able to choose their words carefully, take responsibility, and solve the problem by having options ready. They also need to always follow up with the client.

Repeat clients are the foundation of a healthy business. However, not all clients are alike. Here's how to deal with the tough customers.

- Listen carefully to a client's criticism. By asking calm questions, see whether you can discern the main thing that is bothering the client
- Don't interrupt immediately. Unless the client is abusive, it pays to hear what they're saying in full. If someone is abusive, politely ask them to tone down his or her language
- Keep records of your dealings with difficult clients and steps you have taken to deal with their concerns
- Try to see things from the client's point of view, no matter how unreasonable or how irrational he or she seems. What seem to you to be nagging, repetitive phone calls may simply be an expression of the customer feeling stressed for reasons that have nothing to do with the work you're doing
- Avoid arguments. Your goal is to come to an understanding, not to win a confrontation. Acknowledge different viewpoints
- Be encouraging. Often people become hostile when they feel frustrated or confused
- Stay calm. If you can't stay calm, terminate the call or meeting until you can respond less heatedly

It's easier to not start a relationship than it is to sever an ongoing relationship. Keep an eye out for warning signs such as potential conflicts of interest or involvement in a high-risk business. But be warned. Some clients just aren't worth the trouble. Beware of any client who tries to involve you in illegal or unethical schemes.

Don't quibble over small stuff. Remember, the client is always right, even when he or she is wrong.

Learn as much about your client's needs and pet as possible. The more you know, the more you'll be able to give the client what he or she needs.

## KEY LEARNING OBJECTIVES

- Difficult clients are usually difficult for a reason – either due to distress or poor communication
- How to create, deliver and manage expectations, especially failed expectations
- Know how to deal with the client's and your own emotions in a resolution discussion

## MULTIPLE CHOICE QUESTIONS

1. What is clarity of communication NOT about?
  - (A) Being clear in your own mind about what you want to communicate
  - (B) Delivering the message succinctly
  - (C) Telling people repeatedly what you want them to understand
  - (D) Ensuring that the message has been clearly and correctly understood
2. What should you do when managing actual or perceived failed expectations from a client?
  - (A) Be polite, be patient and listen
  - (B) Restate to the customer's what they did wrong
  - (C) Deny that there is a problem really
  - (D) Let the client scream!
3. Using the GROW coaching model R stands for
  - (A) Realistic – as in 'please be realistic'
  - (B) Right – as in 'there is a right (and wrong) answer here'
  - (C) Routine – as in 'we have a protocol that needs to be followed'
  - (D) Reality – as in 'what are the facts, situation, current status?'





## Section V

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# Management streams

Sunday 7 April

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Sunday 7 April  
Hall 7

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# Management

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- 320 08:45–09:35  
**Top five reasons vets get sued and how to avoid them as a recent graduate**  
Dave Nicol
- 321 10:05–10:55  
**Putting you first: how to manage body and mind to avoid burnout, depression and other negatives**  
Dave Nicol
- 321 11:00–11:45  
**Personal branding for vets: why you need one and how to become the local pet celebrity**  
Dave Nicol

## Top five reasons vets get sued and how to avoid them as a recent graduate

**Dave Nicol**

How do new veterinary graduates generally find themselves slapped with lawsuits? Typically, what happens is we get complaints from disgruntled pet owners. These complaints, if deemed sufficiently serious, are then followed up with some form of legal investigative process. The objective of the process is usually to try to recover money but also to ensure the required standard of practice was met, or will be met in the future.

The good news is that such complaints rarely follow this course. It is far more common, for example, for a complaint to be dealt with internally, without resorting to legal recourse. As new graduates we are genuinely afraid of being sued but the truth is, it doesn't occur that often. And that's good news for us all.

New graduates should take comfort and encouragement from data unearthed from one of the larger veterinary boards (the organizations that regulate veterinarians) in Australia. This reliable data showed that, in Australia, there appeared to be no correlation between years of experience and complaints to veterinary authorities. For example, the average number of complaints in the first year after graduation was three, while the highest number of complaints was eight, and that came 24 years after graduation. In fact, on a graph, each of the tall skyscrapers were for experienced doctors, which is the opposite of what you might expect. Incidentally, these trends were also present in the data documented within the United Kingdom.

When you delve into the reasons for complaints, the questions answer themselves. As new graduates, we think bad things will happen because we are inexperienced. Of course, that's true to some extent. But we're also aware of the potential for getting sued, which makes us more careful and more tentative. We're not yet at a stage where we begin to take chances or start believing our own hype. So we're cautious and that probably protects us a bit.

### COMMON REASONS FOR COMPLAINTS LODGED AGAINST VETERINARY SURGEONS

There are five common ways people receive complaints:

- Poor communication
- Misdiagnosis leading to delayed or wrong treatment
- Poor standard leading to negative outcome for patient

- Unrealistic expectations set by veterinary surgeon
- Doing too much with too little

And there are also ways to avoid negative outcomes. Here's how you minimize your risk.

- Build rapport: people are less likely to sue you if they like you
- Treat your clients and their pets with respect and kindness
- Be confident but know your limits
- Make sure you have delivered a clear and coherent plan to your pet owner
- Communicate costs before doing any work
- Communicate changes to the plan before doing work
- Master complaint resolution
- Stay current
- Get a second opinion on anything if you are unsure
- Keep clear, detailed and contemporaneous clinical records

### KEY LEARNING OBJECTIVES

- To know the common ways veterinary surgeons get sued
- To be able to develop the skills required to minimize the risk of having a serious complaint lodged against you as a veterinary surgeon
- To not be stressed about being sued

### MULTIPLE CHOICE QUESTIONS

1. Which is NOT a reason for getting sued?  
(A) You made the wrong diagnosis and an animal suffered as a result  
(B) You had porridge for breakfast  
(C) You promised to cure an inoperable cancer and the client paid a lot of money to try  
(D) You were practising as a veterinary surgeon without a degree
2. Which of the following is TRUE?  
(A) You will be more likely to be sued immediately on graduating  
(B) You will be more likely to be sued 1 year post graduation  
(C) You will be more likely to be sued 10 years post graduation  
(D) There is no correlation with years post graduation and getting sued
3. What things should you do to reduce your chances of being sued?  
(A) Build rapport: people are less likely to sue you if they like you  
(B) Treat your clients and their pets with respect and kindness  
(C) Be confident but know your limits  
(D) All of the above

# Putting you first: how to manage body and mind to avoid burnout, depression and other negatives

**Dave Nicol**

The job of being a veterinary surgeon is hard on both body and mind. If not managed carefully then the daily efforts required by veterinary surgeons can and do wear many professionals down, leading to mental, emotional and physical exhaustion. Those affected inevitably enter a negative feedback loop that results in poor performance, low esteem and unhappiness (and worse).

In this presentation Dr Dave Nicol explores the topic and looks into the emotional triggers and internal story telling that lead to this outcome. And will show delegates how to successfully rewire their thinking. Delegates will learn the classic signs of burnout. They will also explore the part that emotions, beliefs and internal storytelling play in the development of a poor emotional state.

They will learn some effective tools that will allow them to recognize:

- Risk moments
- How to spot a poor story or belief
- What things can contribute to a poor emotional state and create anxiety

Delegates will also then learn some highly effective tools to manage mental state and to become more resilient in the face of challenge. These fall into two categories:

- Mental judo – managing the internal dialogue and telling a better story
- Daily habits to improve mental state

## KEY LEARNING OBJECTIVES

- For delegates to clearly understand that burnout is a sign of a mismanaged mental and physical state and to be absolutely clear who is responsible for managing this state
- To understand the contributors to anxiety and the warning signs of running in the red 'danger zone'
- To be able to effectively deploy countermeasures to be able to handle the daily routine events that are unavoidable, but with the right mindset can be handled effectively without mental harm

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is NOT a sign of a negative mental state?
  - (A) Tiredness
  - (B) Irritability
  - (C) Singing out loud in the shower
  - (D) Poor sleep
2. Who has the greatest responsibility for your mental and physical health?
  - (A) Your boss
  - (B) The government
  - (C) The RCVS
  - (D) You
3. Which of the following does NOT help your mental state?
  - (A) Sleep
  - (B) Spending time with people you love
  - (C) Walking in nature
  - (D) Social media

# Personal branding for vets: why you need one and how to become the local pet celebrity

**Dave Nicol**

Personal brands are everywhere nowadays with influencers changing the course of businesses in every field and facet of business. Veterinary medicine is no different. While the older generation seem to have avoided or ignored social tools, the same cannot be said of the millennials, who are embracing the technology with both hands.

Customers do business with those people and brands they know, trust and like. So a personal brand can be a massive tool to support and accelerate the career of any savvy young veterinary surgeons out there.

A personal brand is developed when an individual starts to create content that is noteworthy and other people start to take notice of and follow. So it is not for the faint hearted. Most will not have the determination to put in the work required. And many will run from the spotlight, but for those willing to engage, they sky is the limit.

Content creation is the basis of any personal branding strategy. This content can come in many forms: words, sounds, video and images. A good strategy will take advantage of as many formats as possible. My advice is to publish content to a blog or Youtube channel every week or a Facebook/Instagram page every day. Anything less and you are invisible.

Here are three techniques I rely on that will work for you too.

- Think about your audience first. What do they want, what do they need? What do they love or hate?

What keeps them awake or drives them crazy about animals. What things get them super-curious? What makes them laugh? What things make them go 'awwww' about their pets? Write about things that evoke emotions not put people to sleep

- Your story is amazing, so tell it. Veterinary surgeons have a gift that many business owners would kill for – subject matter that is genuinely interesting. Saving lives is sexy. Pets are engaging (which is why kittens dominate the internet). Our path in life is an emotional journey, an engaging soap opera unfolding before our eyes daily. The simplest way to write a meaningful blog is to simply describe the things you see and do each day. Just do so with the pet owner in mind. They are unlikely to care about the specific technique you used to repair the problem. But they will care about the impact or your fears and hopes going into the surgery. Veterinary medicine is a wonderful daily mash-up of tragedy and comedy, use this to your advantage
- Write a list. 'Top Tips' articles are quick, easy and when done well, grab attention. Think of a topic. Start with the title and then the rest flows easily

Regardless of the technique you use to generate your content, the most important thing is simply having the will to meet your deadline whenever that falls. Most people fail because they lack the commitment and patience required to execute a content marketing strategy.

## KEY LEARNING OBJECTIVES

- Understand what a personal brand is
- To understand some easy ways to begin generating the type of content required to build a personal brand
- To avoid the common pitfalls for those who wish to develop a personal brand

## MULTIPLE CHOICE QUESTIONS

1. What is a personal brand?
  - (A) A tool that can help you build relationships with clients
  - (B) A way of differentiating yourself and increasing your value to a practice
  - (C) A strategy that requires you to have something useful to say
  - (D) All of the above
2. A personal brand can be built using which of the following?
  - (A) Blogs
  - (B) Youtube
  - (C) Instagram
  - (D) All of the above
3. People connect best with which of the following?
  - (A) Stories
  - (B) Facebook
  - (C) Youtube
  - (D) TV

## Section VI

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# Open To All Streams

Thursday 4 April

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Thursday 4 April  
Hall 3

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# Obesity

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- 326 08:30–09:15  
**The principles of weight management: using scientific evidence to maximize success**  
Alexander German
- 326 09:25–10:10  
**The practicalities of weight management: making it work in your practice**  
Georgia Woods
- 327 11:05–11:50  
**Tackling the obese patient with concurrent disease: what are your priorities?**  
Alexander German
- 328 12:00–12:45  
**Can obesity be prevented?**  
Alexander German

## The principles of weight management: using scientific evidence to maximize success

### Alexander German

Recently, canine and feline obesity has recently been formally classified as a disease by the American Veterinary Medical Association, and, arguably, it is now the biggest health and welfare issue affecting pet dogs. Although successful weight loss has health benefits, current strategies are suboptimal, with many obese pets that start a weight programme failing to lose weight, or subsequently rebounding. Given that current weight-loss strategies are not perfect, clinicians need to focus carefully on tailoring the programme, perhaps setting a pragmatic target for weight loss, so as to ensure the benefits are maximized. This review will summarize key findings from recent clinical research into pet obesity, and present a framework for improving success, by better tailoring weight-management regimes and endpoints to the individual.

### KEY LEARNING OBJECTIVES

- Outline the factors associated with failure of overweight dogs and cats to reach target during weight management or to rebound subsequently

- Explain the concept of 'the law of diminishing returns' as it relates to weight management in dogs and cats
- Suggest pragmatic targets for overweight dogs and cats undergoing controlled weight loss

### MULTIPLE CHOICE QUESTIONS

1. What proportion of pets regain weight after successfully completing a weight-loss programme?  
(A) 10%  
(B) 25%  
(C) 50%  
(D) 75%
2. You have recently started an obese dog on a weight-loss programme. What would the expected rate of weight loss be in the first 4 weeks?  
(A) 2.0–3.0% of starting body weight per week  
(B) 1.5–2.0% of starting body weight per week  
(C) 1.0–1.5% of starting body weight per week  
(D) 0.5–1.0% of starting body weight per week
3. When during a weight-loss programme would you expect to start seeing significant lean tissue loss?  
(A) After 10% weight loss  
(B) After 20% weight loss  
(C) After 25% weight loss  
(D) After 30% weight loss

## The practicalities of weight management: making it work in your practice

### Georgia Woods

Given that obesity is now such a prevalent disease, practices must have robust systems in place to address it. Successful weight management requires a combination of dietary restriction and increased physical activity. Knowing these basic principles is essential but how this information is explained to owners will be vital to managing obesity effectively. Forming strong bonds with the owners of the obese patient will be influential throughout the programme, so should be given careful consideration alongside the more practical advice given on feeding and activity.

This lecture will discuss the practical approach to weight management and give useful guidance on how to make it work in your clinic. Communication is key, not

only for obtaining all the necessary information on medical and dietary history, lifestyle and normal routines, but also in the delivery of the advice that is given. The communication style will affect the owner's acceptance, understanding and compliance with the programme. Information gathering is vital in the initial assessment, so the lecture will discuss the various ways in which information may be gathered both verbally and in written form. Each weight-management programme should be individualized for pet and owner, so the lecture will also describe the common factors that all good weight-loss programmes need to give the best chance of success.

### KEY LEARNING OBJECTIVES

- Recognize obesity in cats and dogs and factors that might influence the success of weight management
- Describe strategies used for weight management in dogs and cats, and outline some of the sources of potential difficulty, areas where things commonly go wrong and how to prevent these
- Discuss different techniques that can be used to communicate with owners about pet obesity and demonstrate how they can be used to ensure good compliance with the weight-management programme

## MULTIPLE CHOICE QUESTIONS

- What percentage of dogs in the UK are currently thought to be overweight or obese?  
(A) 33% (C) 12%  
(B) 65% (D) 54%
- WSAVA now recommends that all practices should use a 9-point body condition score chart when assessing the severity of obesity. A score of 8/9 on a 9-point body condition score

chart represents what percentage above optimal weight?

- 40%
  - 10%
  - 35%
  - 30%
- What is the best food type for weight loss?  
(A) Wet only  
(B) Dry only  
(C) Wet and dry in combinations  
(D) It doesn't matter

# Tackling the obese patient with concurrent disease: what are your priorities?

Alexander German

Obesity is now a major health and welfare concern in companion animals. Overweight dogs and cats are at increased risk of developing comorbidities including: diabetes mellitus, musculoskeletal disease, neoplasia, oral cavity disease, skin disease and urinary tract disease. Increased adiposity can adversely affect respiratory function, cause metabolic derangements including insulin resistance and also affect renal function and health. Although weight-management programmes can be successful, outcomes are often disappointing with many animals either failing to reach target weight or regaining weight subsequently.

This talk will consider obesity as a disease and provide guidance on clinical priorities for weight management when other diseases are present. The concept of tailoring weight management to the individual will be considered, whereby the target for weight loss is set according to individual circumstances. Case examples will be used to illustrate the concepts covered.

## KEY LEARNING OBJECTIVES

- Appraise the health and welfare benefits of weight-management regimens in overweight dogs and cats
- Compare and contrast the characteristics of complete and partial weight-management regimens, and give examples of when each would be used
- Suggest pragmatic targets for weight-management regimens in overweight dogs and cats with concurrent illness

## MULTIPLE CHOICE QUESTIONS

- You have just started an obese Labrador Retriever with osteoarthritis on a weight-loss

programme. The dog weighs 62 kg and has a body condition score of 8/9. At what weight would you predict to start seeing improvements in mobility?

- 58 kg
  - 56 kg
  - 54 kg
  - 52 kg
- What influence does concurrent orthopaedic disease have on the outcome of weight management in overweight dogs?  
(A) Dietary energy intake will need to be restricted more severely, weight loss will be slower and the dog will be less likely to reach its target weight  
(B) Dietary energy intake will need to be restricted more severely and weight loss will be slower, but there will be no effect on the likelihood of the dog reaching its target weight  
(C) Dietary energy intake will need to be restricted more severely and the dog will be less likely to reach its target weight, but rate of weight loss will not be slower  
(D) Dietary energy intake will need to be restricted more severely, but rate of weight loss will not be slower and there will be no effect on the likelihood of the dog reaching its target weight
  - You have just diagnosed a grade II mast cell tumour in an obese 6-year-old English Bulldog. The dog weighs 25.0 kg and has a body condition score of 9/9. There is also severe concurrent brachycephalic airway disease and you suspect that the weight is exacerbating this. What would a sensible **target body weight** be for this dog?  
(A) No weight loss is appropriate in this case  
(B) 23.7 kg would be a suitable target in this case  
(C) 22.5 kg would be suitable target in this case  
(D) 18.0 kg would be a suitable target in this case

## Can obesity be prevented?

Alexander German

Obesity is now a major and highly prevalent medical disease in dogs and cats, which affects the quality of life of many dogs and cats throughout the world. Whilst weight-loss protocols aimed at treating the disease are commonly used, long-term outcomes are disappointing. Indeed, many obese pets who start a programme fail to complete it, and those who do frequently rebound subsequently. As a result, it makes sense to focus on prevention rather than cure. This talk will first review the outcomes of weight management in obese dogs and cats, before defining types of prevention and applying them to obesity management. Suggestions will be made for a lifelong practice monitoring programme for prevention of obesity.

### KEY LEARNING OBJECTIVES

- Identify risk factors for the development of obesity in dogs and cats, and explain how they can be used in an obesity-prevention plan
- Define the terms primary prevention, secondary prevention and tertiary prevention; and then give examples of each in the context of companion animal obesity
- Outline an obesity-prevention plan for dogs and cats attending a primary care veterinary practice

### MULTIPLE CHOICE QUESTIONS

1. A veterinary surgeon examines an obese domestic shorthair cat, bodyweight 9.40 kg, body condition score 9+/9. On history and

physical examination, there are no obvious concurrent disorders. The veterinary surgeon decides to start a weight-management plan with the final target being the cat's ideal weight. Which type of prevention is this?

- (A) Primary prevention
- (B) Secondary prevention
- (C) Tertiary prevention
- (D) Neither primary, secondary nor tertiary prevention

2. After the Christmas/New Year vacation, a veterinary practice decides to promote its weight-management programme to all clients using a combination of emails, social media, information on their website, and posters displayed in the practice waiting room. Owners are encouraged to assess the body condition of their own pet and schedule an appointment with the veterinary practice if they are concerned. Which type of prevention is this?

- (A) Primary prevention
- (B) Secondary prevention
- (C) Tertiary prevention
- (D) Neither primary, secondary nor tertiary prevention

3. A recently diagnosed neutered female diabetic cat has a bodyweight of 6.5 kg and a body condition score of 7/9. The cat is stable on PZI insulin 2 units q12h s.c. and a high-protein low-carbohydrate diet fed twice daily at maintenance energy requirement. The veterinarian elects not to change the therapy. Which type of prevention is this?

- (A) Primary prevention
- (B) Secondary prevention
- (C) Tertiary prevention
- (D) Neither primary, secondary nor tertiary prevention

Thursday 4 April  
Hall 3

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# Reproduction

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- 330 14:05–14:50  
**Hormone testing**  
Gary England
- 331 15:00–15:45  
**Managing the pregnant bitch**  
Angelika von Heimendahl
- 332 15:50–16:35  
**Managing parturition: when do I reach for the scalpel?**  
Angelika von Heimendahl
- 334 16:40–17:25  
**First 48 hours**  
Sylvie Chastant

Hormone testing

Gary England

A variety of hormones can be measured to facilitate investigation of reproductive function. Common indications for hormone measurement will be discussed.

WHEN TO BREED

Measurement of oestrogen concentrations are unhelpful, however there is a good relationship between the peri-ovulatory rise in progesterone and the fertilization period (Figure 1).

PREGNANCY DIAGNOSIS

Progesterone concentrations differ between pregnant and non-pregnant dogs but not sufficiently for a single sample to be diagnostic. Placental relaxin is specific to pregnancy and is elevated from day 20 (but easily detectable from day 25).

PREGNANCY FAILURE

Whilst after pregnancy failure progesterone declines, there is no good evidence (except in German Shepherd Dogs and related breeds) that low progesterone causes failure. In affected breeds, detecting low progesterone may allow exogenous supplementation but this should be undertaken with extreme caution (risk of neonatal genital tract abnormalities and prolonged parturition).

PREDICTION OF WHELPING

Pregnancy length is remarkably consistent at 62–64 days from ovulation; whelping can therefore be anticipated by measurement of progesterone during oestrus.

- Progesterone ≈ 21 nmol/l(7 ng/ml) = ovulation = whelping in 63 ± 1 day
- Progesterone ≈ 32 nmol/l(10 ng/ml) = beginning of fertilization period = whelping in 61 ± 1 day

Stage of cycle	Progesterone concentration nmol/l(ng/ml)	Range (ng/ml)
Luteinizing hormone surge	8 (2.5)	2.3–3.0
Ovulation	21 (7.0)	5.0–9.0
Beginning of fertilization period	32 (10.0)	8.0–15.0
Middle of fertilization period	45 (15.0)	10.0–30.0
End of fertilization period	85 (28.0)	25.0–40.0

Figure 1: Relationship between progesterone concentration and the fertilization period

Days in relation to parturition	Progesterone (nmol/l)	Progesterone (ng/ml)
–5	15	4.7 ± 0.7
–2	7	2.4 ± 0.5
–1	4	1.4 ± 0.2
0	1	0.4 ± 0.3

Figure 2: Progesterone concentration and whelping

At the end of pregnancy progesterone decreases to basal levels (24–36 hours before whelping). Detection of high progesterone concentrations indicate that whelping is not imminent, whereas basal concentrations indicate that whelping should have begun (Figure 2).

Overall, first detection of progesterone <6 nmol/l (2.0 ng/ml) is associated with whelping within 26 hours. First detection of progesterone <10 nmol/l(3.0 ng/ml) is associated with whelping within 50 hours.

INCOMPLETE OVARECTOMY

Incomplete ovariectomy is not uncommon and usually results in a return of oestrous behaviour. Depending upon the time of examination a variety of hormone measurements may be diagnostic (simplest methods are shown in bold).

- Currently thought to be in oestrus:
  - Progesterone – not diagnostic
  - Oestrogen – not reliable (**use vaginal cytology**)
  - Oestrogen stimulation test – not reliable
  - Anti-Mullerian hormone – no data available
  - Basal LH – not reliable
- Oestrus was observed within the last 2 months:
  - Progesterone – **diagnostic**
  - Oestrogen – not diagnostic
  - Oestrogen stimulation test – diagnostic
  - Anti-Mullerian hormone – likely to be diagnostic
  - Basal LH – not diagnostic
- Oestrus was observed 2–7 months previously:
  - Progesterone – not diagnostic
  - Oestrogen – not diagnostic
  - **Oestrogen stimulation test – diagnostic**
  - Anti-Mullerian hormone – likely to be diagnostic
  - Basal LH – diagnostic

KEY LEARNING OBJECTIVES

- Understand the normal endocrinology of the reproductive cycle of the bitch and recognize how measurement of reproductive hormones can be diagnostic of various stages of the cycle
- Appreciate changes in progesterone concentration during oestrus and prior to parturition and how measurement of progesterone can be used to predict the likely time of whelping
- Be able to differentiate the endocrine environment in a neutered bitch from a normal cycling bitch

## MULTIPLE CHOICE QUESTIONS

- To determine the optimal time to breed which one of the following statements is CORRECT in relation to measurement of plasma progesterone?
  - Detecting progesterone less than 8 nmol/l (2.5 ng/ml) indicates that the bitch is still in pro-oestrus
  - Detecting progesterone less than 8 nmol/l (2.5 ng/ml) indicates that the bitch has already ovulated and the fertilization period has been missed
  - Detecting progesterone concentrations of 21 nmol/l (7.0 ng/ml) indicates that the bitch has ovulated and therefore it is too late to mate
  - Detecting progesterone concentrations greater than 85 nmol/l (28 ng/ml) indicates that the bitch just ovulated and therefore mating should occur immediately
- You examine a bitch to determine the optimal time to breed and take a blood sample for progesterone measurement using a qualitative enzyme-linked immunosorbent assay (ELISA). Progesterone concentrations are 'high' and you advise mating immediately. However, the bitch refuses to stand. Vaginal cytology shows 5% parabasal, 15% small intermediate, 40% large intermediate, 40% anuclear epithelial cells, with 10 polymorphonuclear leucocytes per high power field. Which one of the following is the MOST LIKELY diagnosis?
  - The bitch is still in early proestrus and should be re-examined in 2–3 days
  - The bitch is in oestrus but for behavioural reasons will not stand and so should be inseminated
  - The bitch has ovulated today and should be mated in 2 days
  - The bitch has ovulated and the fertilization period has ended
- A 3-year-old bitch was neutered 3 months after the end of oestrus. Four months later she has a swollen vulva and a serosanguinous vulval discharge. Plasma progesterone concentrations are 1.6 nmol/l (0.5 ng/ml) (low) and plasma oestrogen concentrations are 55 pmol/l (15 pg/ml) (low). Which one of the following is the MOST LIKELY explanation?
  - Ovarian remnant is not likely since both oestrogen and progesterone concentrations are low
  - Ovarian remnant is likely since both oestrogen and progesterone concentrations are low
  - Ovarian remnant is probable but is not likely to be detected by hormone measurement at this time
  - Clinical signs of oestrus are most likely due to reasons not associated with the reproductive tract

## Managing the pregnant bitch

### Angelika von Heimendahl

After successful conception breeders need support to look after a pregnant animal to maximize the number of healthy puppies and the chances of a normal birth.

### PREGNANCY DIAGNOSIS

The most common method of pregnancy diagnosis is ultrasonography. Depending on the quality of the equipment and the experience of the operator, ultrasonography gives good results from 25 days of pregnancy onwards, including the number of puppies and foetal heartbeats. The breeder's wish for very early scans should be resisted in order to have a meaningful result. Although exact numbers are not important, single- or two-puppy pregnancies should be diagnosed in order to prepare for a possible elective Caesarean.

### MEDICATION DURING PREGNANCY

If bitches fall ill during pregnancy or have chronic conditions that need continued treatment, there are drugs that can be used with relative safety in order to support the bitch without endangering the health and development of the puppies. Some common conditions that may develop through pregnancy are discussed.

### DEALING WITH SINGLE-PUPPY PREGNANCIES

These have a higher percentage of inertia and dystocia and therefore need to be managed carefully during pregnancy and at the time of parturition.

### LOSS OF ONE OR MORE PUPPIES DURING PREGNANCY

Abortion of one or more foetuses whilst the pregnancy continues is not uncommon. This is very worrying for the breeder and diagnosis of the possible causes is important to try to take the remaining foetuses to full term.

# Reproduction

## NUTRITION DURING PREGNANCY

A rising plane of nutrition and a different composition of food are especially important in the last trimester of pregnancy.

## PREPARATION FOR THE BIRTH

The drop in progesterone at the end of pregnancy induces a drop of body temperature, which can easily be monitored by the breeder. Parturition should take place within 24 hours of the temperature dropping. Most experienced breeders have their specific set-up for the birth, but new breeders may need help with normal parameters at birth, such as first- and second-stage labour, time between puppies being born and what to do with the placentas. Colostrum replacer should be ready in case it is needed in the first 24 hours after parturition.

## INFORMATION LEAFLET FROM THE VETERINARY PRACTICE FOR BREEDERS

The practice should provide a leaflet suggesting the set-up of the area for whelping, temperature requirements for neonates, behaviour around labour and normal parameters at birth. It should include a clear guide to surgery hours and out-of-hours services, giving telephone numbers and the address of the premises to go to if help is needed.

## KEY LEARNING OBJECTIVES

- Pregnancy diagnosis and advising clients about a normal pregnancy
- Emergencies during pregnancy
- Preparing for parturition depending on different scenarios

## MULTIPLE CHOICE QUESTIONS

1. A bitch has been scanned with five puppies at 30 days after progesterone testing and ovulation. On day 50 she develops haemorrhagic discharge and foetal parts are expelled. The animal is well in herself otherwise. How would you proceed?

- (A) Perform elective Caesarean to save the other puppies
- (B) Administer antibiotics and non-steroidal anti-inflammatory drugs (NSAIDs) to stabilize the bitch
- (C) Monitor progesterone and perform ultrasound scan to check viability of remaining foetuses
- (D) Administer alogliptone to abort the other foetuses and prevent further death in utero

2. A new breeder is concerned how much food she should be feeding her pregnant bitch, a 3-year-old healthy Springer Spaniel that has been confirmed pregnant with seven puppies. What would you advise?

- (A) Feed rising slowly toward normal maintenance + 30% at the end of pregnancy
- (B) Feed rising slowly toward normal maintenance + 80% at the end of pregnancy
- (C) Feed rising slowly toward normal maintenance + 100% at the end of pregnancy
- (D) Keep on normal maintenance to get bitch into optimum body condition at whelping

3. A heavily overweight 4-year-old Newfoundland bitch is presented for ultrasound scan to determine if she is pregnant 38 days after the first mating. No blood progesterone was taken at the time to determine ovulation and she was mated three times over 6 days. This would be her first litter. Ultrasonography, due to the size of the abdomen is inconclusive, and a foetus cannot be visualized. How should you proceed?

- (A) Radiograph to determine whether she is pregnant and how many foetuses
- (B) Ask the breeder to come back in 10 days to repeat ultrasound scan when the pregnancy will be more visible
- (C) Ask the breeder to monitor outward signs such as mammary development and nesting
- (D) Advise the breeder to get ready anyway in case she is pregnant and any monitor temperature drop

# Managing parturition: when do I reach for the scalpel?

Angelika von Heimendahl

## NORMAL PARTURITION

To feel comfortable with the progression of labour and parturition it is important to have normal parameters for first- and second-stage labour, times between puppies and the length of a birth from start to finish. Knowing

when a bitch should give birth and when she is 'overdue' can also be difficult given the long survival of canine spermatozoa and oocytes in the reproductive tract.

## CAESAREANS IN GENERAL

Caesareans are highly successful obstetrical interventions that can save the lives of puppies and/or bitch. Performed at the right time they are often the only option when normal progression of parturition has not set in or has stopped. On the other hand, they are invasive, more costly, have a higher percentage of complications and lower fertility for future breedings.

The increased popularity of elective Caesareans for brachiocephalic breeds and bitches in first-stage labour can present an ethical dilemma for the practitioner.



Some of these breed have a 100% section rate. The UK Kennel Club runs a scheme that releases the veterinary surgeon from the professional obligation to maintain confidentiality (RCVS Guide to Professional Conduct part 2A) and encourages the registration of Caesareans. To be able to register puppies the bitch must not have more than two sections.

## PREDISPOSITIONS FOR CAESAREANS

- Brachiocephalic breeds have, not surprisingly, the highest section rates. Dimensions of the maternal inner pelvis and size of the foetal head and shoulder can be a problem. These breeds also have a relatively high percentage of malformed foetuses that can lead to dystocia
- The second biggest group are giant breeds, which due to their large litter sizes, are prone to secondary inertia
- Single- or two-puppy pregnancies have an increased risk of primary inertia and a tendency for the puppies to grow very large which causes problems at birth
- Secondary inertia can be hereditary and certain lines or families within the breed can have higher Caesarean section rates
- Inexperienced breeders and stress during the birth can lead to prolonged labour endangering the lives of the puppies

## UNPLANNED CAESAREANS

- Primary and secondary uterine inertia, are common in the bitch and may happen spontaneously even without any prior predisposition
- Foetal oversize can be a single puppy within a normal sized litter that causes dystocia and endangers the timely delivery of the rest of the litter
- More rare events such as uterine torsions, ruptures, prolapses and hernias may require immediate interventions during pregnancy and parturition
- Partial foetal death, whilst littermates are still alive, forces a crucial decision on when to keep going and when to intervene

## AGLEPRISTONE OR SURGERY?

The use of aglepristone as alternative to surgery is discussed for the different scenarios.

## KEY LEARNING OBJECTIVES

- Normal parameters for parturition
- Pregnancies that may predispose for a Caesarean section
- When to wait, when to use aglepristone and when to reach for the scalpel

## MULTIPLE CHOICE QUESTIONS

1. A bitch, confirmed pregnant with eight puppies, is showing greenish-black vaginal discharge on day 52 of her pregnancy. What would you do?
  - (A) Ultrasound scan to confirm heartbeats and wait if there are live foetuses to enable them to go full term
  - (B) Utero verdin is a sign that the pregnancy has been terminated and aglepristone should be given to empty the uterus to avoid foetal remnants and infection
  - (C) Once the first puppy has been born and parturition does not progress, a Caesarean section should be performed
  - (D) If the ultrasound scan confirms that all the foetuses have died a Caesarean should be performed immediately
2. A bitch confirmed pregnant with 10 puppies has given birth to two of them in the last 5 hours. It has been 3.5 hours since the last puppy and the bitch is not showing signs of labour. What would you do?
  - (A) Try small increasing doses of oxytocin and deliver the puppies giving the bitch a rest between injections
  - (B) As she has delivered two puppies the cervix is fully dilated and she has to be given more time to progress with labour
  - (C) Progress to do a Caesarean when she is still well and due to the large number of puppies still to be delivered
  - (D) The bitch should be taken to the surgery for further observation and to deliver the puppies under veterinary care
3. A Bulldog breeder rings up to book an elective Caesarean for a maiden bitch. She has been mated three times over 4 days and no blood progesterone levels were analysed. He is confident that she took to the first mating and she is obviously pregnant. He would like the section 63 days after the first mating. What do you recommend to the breeder?
  - (A) Due to oocyte and sperm survival, mating dates are not reliable to determine the end of pregnancy
  - (B) 63 days is ample time to produce mature puppies even if she has taken to the second or third mating
  - (C) Bulldogs cannot give birth naturally so it is better to be realistic and book the Caesarean
  - (D) He is an experienced breeder and there have not been problems in the past

First 48 hours

Sylvie Chastant

The first 2 days of life are challenging for newborns, which have to succeed in many physiological adaptations from intra- to extrauterine life: finding oxygen and nutrients on their own are difficult but crucial steps for survival. These first 2 days of life are especially critical, and account for 35% of all neonatal deaths (0–21 days). Clinical examination and follow-up over these 2 risky days is based on a limited number of criteria (Figure 1), evaluating intrauterine growth (birthweight), cardiorespiratory function (APGAR) and energy provision (glycaemia, rectal temperature). Thresholds above which the risk of neonatal mortality is increased are defined by breed. Roughly, the 25% lightest puppies (within a given breed) require a specific nursing. The quality of passive immune transfer, usually assessed in large animals through IgG blood concentration, is more easily evaluated in puppies indirectly through growth rate over the first 2 days of life.

Day	Observation to be performed	Situation causing increased risk of neonatal mortality
BIRTH	Maternal behaviour (takes care of newborns or not)	Absence
	Presence of colostrum	Absence
	Congenital abnormality	Presence
	Birthweight	<breed-specific threshold
	Efficient suckling	Absence
	APGAR score	<6
DAY 1	Glycaemia	<5.1 mmol/l (< 92 mg/dl)
	Rectal temperature	<35°C
DAY 2	Glycaemia	<5.1 mmol/l (<92 mg/dl)
	Rectal temperature	<35°C
	Growth rate 0–2 days	<0 (did not get weight from birth)

Figure 1: Clinical examination of puppies in the first 2 days of life

Around 40% of puppies suffer from an energy and/or immune deficit over the first 2 days of life. In cases of negative growth rate over the first 2 days of life, risk of neonatal mortality increases seven-fold. Whereas a deficit in energy can easily be compensated, immune deficit cannot: the intestinal barrier is closed as early as 12 hours after birth. If the absence/insufficiency of dam colostrum can be anticipated, passive immune transfer can be obtained using frozen/thawed colostrum (but not effectively by oral administration of canine serum). Colostrum provides not only energy and IgG, but also IgA and a great variety of antibacterial substances (ensuring intraluminal local intestinal protection), together with hormones and growth factors, responsible for gut development and maturation. Even after intestinal barrier closure, colostrum ingestion is beneficial for puppies' health.

KEY LEARNING OBJECTIVES

- Learning the criteria determining the health status of a puppy within the first 2 days of life
- Knowing the critical thresholds (in numbers) indicating that specific nursing is required
- Learning specific nursing procedures to be implemented in case critical thresholds are reached

MULTIPLE CHOICE QUESTIONS

1. What is the critical threshold for glycaemia of the puppy at 2 days of age?  
(A) 8.3 mmol/l  
(B) 5 mmol/l  
(C) 2.5 mmol/l  
(D) 1.1 mmol/l
2. When is the intestinal barrier closed in puppies?  
(A) 12 hours after birth  
(B) 24 hours after birth  
(C) 48 hours after birth  
(D) 72 hours after birth
3. Which of the following statements about neonatal mortality risk is correct?  
(A) Does not increase if the weight of the puppy decreases by 10% between birth and the age of 2 days  
(B) Increases if the weight of the puppy is not higher than the birthweight  
(C) Does not increase if the APGAR score within the first 8 hours of life is below 6  
(D) APGAR score is predictive of survival only if performed within the first 10 minutes of life as in humans

Thursday 4 April  
Hall 6

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# RCVS

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- 336 08:30–08:50  
**Graduate Outcomes Review: looking to the future**  
Stephen May
- 336 14:05–14:50  
**VN Futures: a VN's guide to wellbeing**  
Laura Black
- 337 15:00–15:45  
**VN Futures: a VN's guide to the Practice Standards Scheme**  
Elizabeth Cox
- 338 15:50–16:35  
**VN Futures: a VN's guide to Schedule 3 and delegation**  
Julie Dugmore
- 338 16:40–17:25  
**VN Futures: a VN's guide to Advanced Practitioner Status**  
Susan Howarth

## Graduate Outcomes Review: looking to the future

**Stephen May**

Throughout the English-speaking world, it is acknowledged that there is an issue involving the preparation of veterinary graduates for the career destination of the majority – general practice. Recent publications suggest that this is associated with a failure of new graduates to recognize the challenge of the sheer variety and nature of, and uncertainty around, the primary care caseload. All acknowledge that veterinary schools have made considerable strides in the development of technical skills in recent years but progress in this aspect of the veterinary skill set has heightened awareness of deficiencies in the so-called non-technical skills. This has led to a renewed focus of educational leaders on the overall capability and employability of veterinary graduates and renewed attention to the development of curricular frameworks that embrace a full range of professional knowledge and competences.

The RCVS pioneered Day One Competences in the late 1990s, and this and its subsequent revisions have contributed to the gradual reorientation of curricular designers from inputs (content) to outcomes (competences). However, to ensure appropriate outcomes are achieved, attention needs to be paid to the delivery of educational programmes, in particular clinical education, so that they prepare students with the skills and resilience to deal with uncertainty and decision-making based on incomplete data sets. This development embraces a trajectory of learning that runs through the 4–6 years of educational degree programme and supports new graduates through their early years in practice. The RCVS Professional Development Phase (PDP) is now accepted and ready for further development, as are the Day One Competences and Year One Competences.

All have an interest in this – the public, the employers, the educators, and not least the students and young graduates who are the future of our profession.

### KEY LEARNING OBJECTIVES

- The requirements for an effective modern curriculum
- The challenges for veterinary students and new graduates
- The process through which the RCVS as regulator responds to public and professional needs

### MULTIPLE CHOICE QUESTIONS

1. In relation to general practice, in particular, what has been identified as the major deficit of new graduates?
  - (A) Scientific knowledge
  - (B) Clinical knowledge
  - (C) Technical skills
  - (D) Non-technical skills
2. Which was the first non-technical skill that veterinary schools explicitly started to develop?
  - (A) Communication
  - (B) Ethical reasoning
  - (C) Mindset
  - (D) Resilience
3. Why did the RCVS first develop its Day One Competences and incorporate these into veterinary school accreditation?
  - (A) It was required by the EU directive that deals with professional education
  - (B) The veterinary schools asked for help with professional skills in academic programmes
  - (C) The profession was concerned that graduates were deficient in technical skills
  - (D) The government required it following 'Tomorrow's Doctors' in medical education

## VN Futures: a VN's guide to wellbeing

**Laura Black**

Well-being has been the focus of the RCVS Mind Matters initiative for a few years, with a focus on mental health, caring for our colleagues and learning to thrive within the veterinary profession. As a registered veterinary nurse (RVN), what can you do to improve not only your own well-being, but also that of your colleagues?

As a starting point ensuring you look after your physical and mental health, by raising awareness within your team and asking are you OK if you notice any changes in

a colleague's behaviour. Well-being is personal to each of us, but by following some basic principles you can enhance your own well-being.

### BE ACTIVE

As RVNs we generally have a physical and active role, however taking time out for yourself and being active outside of work is a major influence in our personal well-being.

### KEEP LEARNING

Within our roles we are learning every day, however once the exams stop we can get into a rut of same old same old. Learning new things, or taking on additional responsibilities helps build confidence and self-esteem,

sharing knowledge is also a great way to improve team well-being.

## GIVING BACK

Do something nice for someone else, a friend or a stranger, volunteer your time. Look out, as well as in.

## CONNECT

Take time to see friends, family and colleagues, think of these as the cornerstones to your life, invest in developing the relationships and ensure you don't neglect these for day-to-day demands.

## TAKE NOTICE

Many people are aware of mindfulness and the positive benefits it can bring. Take notice of your surroundings and take the time to engage with them.

## CARE FOR THE PLANET

Don't take our community for granted, look to see what you can do, even if it is recycling the plastics and paper in the practice and at home.

## MANAGING WELL-BEING WITHIN YOUR PRACTICE

There are simple steps to building a well-being programme/strategy for your practice. Start to look at small areas you could change, having time to talk to each other and recognizing when someone is maybe not managing as well.

Identify the areas which are your practice's priorities. These may be simple things which would help everyone. Do you take a lunch break? How do you reduce stigma of mental health issues? Does your practice have policies in place to help ensure everyone is treated equally?

Where would the team benefit most? Identify training which could help build confidence in managing issues. The RCVS Mind Matters and Mental Health First Aid are a great place to start (Mind Matters and MHFA England).

Each practice will have different priorities, for us it was Managing Mental Health, Mental Health awareness for all our employees, manual handling to reduce health issues including back problems and looking at the health issues for our teams. By putting focus on these areas, we can improve the way individuals work and how the team manages. This, in turn, improves well-being and helps build individuals resilience, resulting in better care for our patients and retention of our team.

# VN Futures: a VN's guide to the Practice Standards Scheme

**Elizabeth Cox**

More than half of veterinary practices in the UK are now accredited under the RCVS Practice Standards Scheme. With the addition of optional practice awards in 2015, the scheme continues to grow. This presentation will explain the scheme, examine the awards and look at the relevance and benefits to practice. A lot of preparation for the assessment is commonly completed by nurses, in addition to ensuring continued compliance. The presentation will look at common pitfalls, commonly asked questions, but more importantly examine how the scheme supports practice, and aids quality of care. Everyone knows you need time to prepare, the presentation can't give you that. It will ensure you leave knowing some handy tips, a good understanding of the scheme and how nurses can use the scheme in their daily role, not just on assessment day.

## KEY LEARNING OBJECTIVES

- Understand the RCVS Practice Standards Scheme and the awards

- Understand the role of the RVN in the Practice Standards Scheme
- Understand common pitfalls, and the benefits to practice and patient care

## MULTIPLE CHOICE QUESTIONS

1. What is the purpose of a Practice Standards Scheme assessment?
  - (A) A box-ticking exercise
  - (B) A legal requirement
  - (C) To help the RCVS know who has completed their CPD requirement
  - (D) An assessment to check standards are met against set criteria
2. What must every practice premises comply with?
  - (A) All requirements of the scheme
  - (B) Every award relevant to the scheme
  - (C) All requirements relevant to the level of accreditation applied for
  - (D) A random selection made by the assessor
3. What is the main role of Stanley?
  - (A) To collect payments due to RCVS
  - (B) See where the assessors are working
  - (C) A storage system for documents
  - (D) Check behaviours and outcomes in practice

## VN Futures: a VN's guide to Schedule 3 and delegation

**Julie Dugmore**

What does the future hold for registered veterinary nurses (RVNs)? Join Julie Dugmore, Director of Veterinary Nursing at the Royal College of Veterinary Surgeons (RCVS), as she walks us through the developing role of veterinary nurses and updates us on the RCVS's review of Schedule 3.

Schedule 3 was first introduced back in 1991 when the RVN role was less defined than it is today. In early 2015, with the granting of the new RCVS Royal Charter, RVNs became recognized as true professionals in their own right and whilst it is still a young profession it now has firm foundations upon which to build its future.

In 2016 the RCVS therefore teamed up with the British Veterinary Nursing Association (BVNA) to launch the VN Futures project, designed to create a blueprint for the future of the veterinary nursing profession. During the evidence-gathering sessions for this project there was found to be a great appetite to increase the number of tasks that RVNs are allowed to undertake, and a great deal of discussion around existing guidance on which surgical tasks (not involving entry into a body cavity) can be delegated. One of the recommendations of the VN Futures report was to 'clarify and bolster the VN role via a reformed Schedule 3' and to this end, RCVS began to undertake a review of Schedule 3.

There will be an opportunity to ask those sticky questions and tell us your thoughts.

### KEY LEARNING OBJECTIVES

- Delegation – who, how and when
- Activities of the Legislation Working Party
- What the future of the RVN may look like

## VN Futures: a VN's guide to Advanced Practitioner Status

**Susan Howarth**

The current RCVS Diploma in Advanced Veterinary Nursing is the only post-qualification veterinary nursing professional award made by the Royal College of Veterinary Surgeons under Royal Charter.

The award, which has been running for 13 years, is set within the *Framework for higher education qualifications in England, Wales and Northern Ireland* (FHEQ) at Level 5 and requires achievement of a minimum of 120 credits (each credit point equating to a notional 10 hours of learning) delivered and assessed by a Higher Education Institution (HEI). In addition, candidates must also achieve the final integrative assessment which has traditionally been assessed by the HEI.

Continuing professional development (CPD) is mandatory for all registered veterinary nurses (RVNs); not

only does this ensure the best possible patient care, it also facilitates career progression. Throughout the VN Futures roadshow meetings, the need for further post-registration qualifications that are accessible, flexible and cost effective was strongly expressed. In addition to specialist clinical pathways, other areas for post-registration awards, such as leadership and management, advanced first opinion and advanced practitioner nursing were also highlighted.

With the above in mind, we have developed a new post-registration framework designed to provide accessible, flexible and affordable professionally recordable post-registration certificates. The framework has been devised to incorporate all levels of registerable veterinary nursing qualifications, to provide a continuum of education and professional advancement for veterinary nurses.

The profession is seeing the value of focused post-registration qualifications to help the development of specialist areas of interest. Veterinary nurses are recognized as true professionals in their own right and now is the time to open the mind to new possibilities and ideas. The introduction of an Advanced Practitioner Status would clearly identify, to the profession and the public, those veterinary nurses who have gained knowledge, competence, skills and experience in a specialist field.

Thursday 4 April  
Hall 8

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# Dealing with MDR Staphylococcal infections

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340 12:00–12:45  
**The lab report says MRSP: what do I need to know?**  
Anette Loeffler

340 14:05–14:50  
**Tough choices: treatment options for MRSP pyoderma**  
Anette Loeffler

341 15:00–15:45  
**Top hygiene tips for dealing with multidrug-resistant skin pathogens in practice**  
Anette Loeffler

# Dealing with MDR Staphylococcal infections

## The lab report says MRSP: what do I need to know?

Anette Loeffler

MRSP (methicillin-resistant *Staphylococcus pseudintermedius*) infections continue to be amongst the most challenging multidrug-resistant bacterial infections in small animal practice. While some practitioners, particularly in the UK, may not have encountered any, others will be seeing increasing numbers (in North America, MRSP nowadays account for up to 50% of staphylococcal skin infections). MRSP is most often identified from skin, wound and ear infections, particularly in patients with chronic skin disease or those undergoing surgery. The prognosis for infection tends to be good, especially if the infection is amenable to topical antibacterial therapy (with a compliant owner and patient). However, MRSP has a zoonotic potential, can be transmitted directly and indirectly between animals and the environment and is nowadays considered a veterinary nosocomial pathogen. Furthermore, dogs can continue to carry MRSP on healthy skin and mucosae for months after infection has resolved, and thus contribute to a public health risk.

This session will summarize information from recently published MRSP guidelines and highlight how they can be applied to general practice in order to mitigate the spread of this multidrug-resistant pathogen. With a focus on the most common types of MRSP infection, discussion points will include diagnosis, how to get the best out of the microbiology report, treatment recommendations and hygiene requirements. Important points for owner education and managing owner expectations and on how to manage patients after infection has resolved will be outlined.

### KEY LEARNING OBJECTIVES

- Understand the wider implications of methicillin-resistant *Staphylococcus pseudintermedius* (MRSP) infection for the patient and the practice
- What is relevant with regard to treatment choices?
- How to prevent MRSP recurrences in my patient and spread to other animals and people

### MULTIPLE CHOICE QUESTIONS

1. Which of the following is TRUE for MRSP infections?
  - (A) They can have a good prognosis given appropriate therapy and provided primary causes can be controlled
  - (B) They are typically severe and have a guarded prognosis
  - (C) Most often affect young or immunocompromised animals
  - (D) Can be resolved with most licensed antimicrobials provided long enough courses are given
2. If an MRSP is isolated, which of these drugs is likely to be ineffective *in vivo* even if *in vitro* susceptibility is reported?
  - (A) Tetracycline
  - (B) Co-amoxiclav
  - (C) Potentiated sulphonamide
  - (D) Enrofloxacin
3. Why is accurate species differentiation between MRSP and MRSA is important?
  - (A) Their epidemiology and host preferences differ
  - (B) Missed identities can lead to unnecessary implementation of hygiene measures
  - (C) Treatment choices are determined based on species identification
  - (D) MRSP is more virulent than MRSA

## Tough choices: treatment options for MRSP pyoderma

Anette Loeffler

This session will provide treatment recommendations for different types of infection and outline common approaches to treatment decisions. As for other multidrug-resistant opportunistic pathogens, the concept 'less is more' with regard to the systemic use of antimicrobials can be applied to many MRSP infections. Case examples will be provided of how, for the most superficial infections, stopping systemic antibacterial treatment, removing implants where possible and using

topical antibacterial therapy can be effective. The pros and cons of topical antibacterial therapy as the sole treatment of superficial pyoderma and MRSP otitis will be discussed. For deep infections where systemic therapy is indicated, treatment options for MRSP can be extremely limited. Basic principles and drug-specific characteristics important for MRSP infections (inducible resistance to clindamycin, class resistance for fluoroquinolones and tetracycline, lack of *in vivo* efficacy for co-amoxiclav despite occasional *in vitro* susceptibility) will be discussed. In some cases, where no licensed drugs are suitable, older drugs or those with smaller safety margins may have to be considered.

Case examples will be presented for the most frequently chosen agents, including a discussion of ethical considerations and responsibilities. In addition, the need for close monitoring of clinical progress will be highlighted as cases of multi-MRSP isolates have emerged where initial improvement on therapy is followed by relapses while on therapy. Drug combination therapies



will be mentioned where appropriate and the importance of treatment for underlying causes will be shown.

## KEY LEARNING OBJECTIVES

- Make correct treatment decisions for different types of methicillin-resistant *Staphylococcus pseudintermedius* (MRSP) pyoderma
- Understand when and how to use some critically important antimicrobials for MRSP
- Manage the wider implications of MRSP pyoderma to prevent recurrences

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is TRUE?
  - (A) MRSP superficial pyoderma should always be treated systemically
  - (B) MRSP superficial pyoderma is best treated with topical therapy alone
  - (C) MRSP infections are not of concern unless they progress to bacteraemia

- (D) Broad-spectrum antimicrobials will be effective against MRSP
2. Which adverse reactions are associated with amikacin therapy in the dog?
  - (A) Hepatotoxicity and orange urine
  - (B) Nephrotoxic and ototoxic
  - (C) Central nervous system adverse effects and blindness
  - (D) Transient diarrhoea
3. Which of the following applies to topical antibacterial shampoo therapy for MRSP superficial canine pyoderma?
  - (A) It is quick and easy to do for owners but should not be used without resistance testing
  - (B) Resistance to topically used agents is a major cause of treatment failure
  - (C) It should always be combined with systemic therapy
  - (D) It can be effective as the sole treatment if used correctly

# Top hygiene tips for dealing with multidrug-resistant skin pathogens in practice

**Anette Loeffler**

The benefits of hygiene measures in hospitals (and by extension in veterinary establishments) have been well recognized and documented for the past nearly 200 years. However, the importance of hygiene may have been neglected again during the more recent golden era of antimicrobials when bacterial infections could be treated more easily and when hygiene levels had improved overall in line with increased sanitation. Now, at a time when antimicrobial resistance presents a major threat to human and animal health, attention to hygiene is warranted again. Even though implementation of hygiene measures may appear cumbersome, not immediately rewarding, time-consuming and costly, it will be one of the major tools for some time to come in preventing and limiting multidrug-resistant (MDR) bacterial pathogens when effective drugs are no longer available or potentially their use is restricted. In the veterinary environment, the potential for contamination of the practice environment with MDR pathogens is particularly great for patients with skin, ear or wound infections, which shed pathogens from skin and mucosal infection and carriage sites and are likely to be visiting the practice frequently for chronic or recurrent primary disease.

With a focus on MRSP and other skin pathogens, this session will provide practical tips on hygiene measures

achievable in most practice and hospital settings (including some tips on improving hand hygiene, a practice traffic light system for barrier nursing and isolation procedures). Examples of 'dos' and 'don'ts' will be provided, focusing on three areas: before, during and after a potential outbreak. A lot can be achieved with simple, inexpensive measures through awareness, some behavioural changes and a microbiologically trained mindset. Lastly, involving owners and the practice team in discussion, funding and implementation of hygiene measures is critical for a successful outcome.

## KEY LEARNING OBJECTIVES

- Recognize practical opportunities for disease prevention through hygiene
- Understand and communicate the benefits of good practice hygiene
- Manage known methicillin-resistant *Staphylococcus pseudintermedius* (MRSP) patients in the practice

## MULTIPLE CHOICE QUESTIONS

1. Which of the following multidrug-resistant bacteria is NOT considered zoonotic?
  - (A) Methicillin-resistant *Staphylococcus pseudintermedius* (MRSP)
  - (B) *Pseudomonas aeruginosa*
  - (C) Methicillin-resistant *Staphylococcus aureus* (MRSA)
  - (D) *Mycobacterium bovis*
2. How long can staphylococci remain viable on dry surfaces?
  - (A) Only a few minutes
  - (B) Up to 2 days

# Dealing with MDR Staphylococcal infections

- (C) Over 1 year
  - (D) Many years as they produce spores
3. Which of the following have NOT been identified as risk factors for MRSA or MRSP?

- (A) Prior hospitalization
- (B) Prior antibiotic usage
- (C) Prior history of pregnancy and whelping
- (D) Prior surgery

## Section VI

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# Open To All Streams

Friday 5 April

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Friday 5 April  
Hall 3

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# Clinical pathology

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## Clinical pathology on a budget

- 346 08:30–09:15  
**Getting more for no more from your laboratory**  
Ian Ramsey
- 347 09:25–10:10  
**Cytology: fine-needle aspirate techniques and solid lumps**  
Kathleen Tennant
- 347 11:05–11:50  
**Cytology: don't forget the blood smear**  
Kathleen Tennant
- 348 12:00–12:45  
**Cytology: fluids**  
Kathleen Tennant
- 349 14:05–14:50  
**When to test and when to treat?**  
Ian Ramsey
- 350 15:00–15:45  
**Point-of-care meters**  
Ian Ramsey

## Clinical pathology refresher for exotics

- 351 16:50–17:35  
**Small mammals**  
John Chitty
- 353 17:45–18:30  
**Reptiles and Birds**  
John Chitty

## Getting more for no more from your laboratory

Ian Ramsey

The 'white heat' of modern veterinary science comes with a price tag that some owners are unable to contemplate. Clinical pathology can be a significant part of that final invoice. This cost can be reduced by careful case selection and choice of test. However, there are risks in this approach both in terms of patient welfare and practice economics. It is important to discuss all these costs and the risks of cost reduction with clients before embarking on any given course. Few in-house laboratories are cheaper than their commercial counterparts. Commercial laboratories can offer a more reliable service but there is an increased delay in getting results. Equally some tests are much cheaper if performed in practice (for example examination of a blood smear) but training, practice and experience are important.

Many external laboratories encourage the use of panels of tests. These selections can be beguilingly easy to choose, but some of the tests included within them are unnecessary in certain clinical situations. What constitutes an 'adequate work-up' should not be determined by a text book. The diagnostic criteria presented in research papers or used by referral practices may not be appropriate in a first-opinion practice. In general, the greater the number of clinical signs that are consistent with a diagnosis then the less rigorous the confirmation of the diagnosis is required to be. Large panels of tests increase the likelihood of results being outwith 'reference ranges' that may not be relevant to the patient, leading to misleading information and potentially incorrect diagnoses. Clinicians can save their clients considerable expense by contacting clinical pathologists to discuss the clinical history and the results of any diagnostic tests. All external laboratories provide telephone advice and can direct clinicians to further specialist advice on treatment if needed. Getting all the help and advice that you can reduces the risks of misdiagnosis and incorrect treatment.

The use of external laboratories also provides a huge opportunity for unofficial CPD. Examining blood smears and cytological preparations for yourself in those cases where samples are submitted allows you to better help those cases where owners cannot afford external expertise. Experience only comes with practice – and lack of practice damages self-confidence. Examining our own cytological preparations and blood smears allows us to better appreciate the comments made by external laboratories. Similarly, with biochemical results, a clinician is well advised to consider their own interpretation before looking at all interpretations that are provided both as an educational exercise and as critical control point. A clinician may never be as good as an expert in clinical pathology in an external laboratory, but that does not mean we can resign our responsibility for the final diagnosis. Therefore, we need to some extent to check that the

laboratory report fits in with our clinical impression and not be led by the numbers or other people's interpretations.

Key to effective case selection is a detailed clinical examination with a focused patient history. This then needs to be communicated to the laboratory. The author believes that this communication is the attending clinician's responsibility and should not be delegated. However, this communication must also be brief – a PDF file of 78 pages of clinical notes is no more appropriate than one word. It is helpful to try to identify, then refine, the question that the clinician hopes the clinical pathologist will be able to help answer. 'What is wrong with my patient?' is too general!

### KEY LEARNING OBJECTIVES

- You will know what is meant by the term 'clinical pathology on a budget' and the limitations and shifts in responsibilities that it imposes
- You will consider the range of outputs of external laboratories and how you can use these to their maximal effect in specific examples
- You will know the advantages of providing external laboratories with a good summary of the medical history and what is contained (and not contained) within that history

### MULTIPLE CHOICE QUESTIONS

1. You are presented with a 13-year-old cat with a 3-month history of weight loss and lethargy but the owner reports no recent changes in appetite, thirst, urination and defecation. A detailed clinical examination is unremarkable. Your laboratory offers you an 'old thin cat profile' (consisting of T4, blood urea nitrogen (BUN), creatinine, alanine aminotransferase (ALT), alkaline phosphatase, glucose, urinalysis). What would be the most effective way of reducing the cost to the client?  
(A) Just test blood glucose first  
(B) Just test T4 first  
(C) Just test creatinine first  
(D) Just perform urinalysis first
2. Which group of clinical pathology tests is nearly always best done at an external laboratory?  
(A) Biochemistry  
(B) Endocrinology  
(C) Haematology  
(D) Urinalysis
3. What is the approximate incidence of abnormalities on a 'pre-anaesthetic profile' performed in otherwise healthy dogs such that anaesthesia would be postponed or the protocol changed?  
(A) 10%  
(B) 3%  
(C) 1%  
(D) 0.3%

# Cytology: fine-needle aspirate techniques and solid lumps

**Kathleen Tennant**

Fine-needle aspiration of lumps and bumps can be a quick and relatively cheap way of screening lesions for those requiring more intensive treatment/assessment from those expected to have a more benign course.

Sampling with a variety of needle sizes and smear techniques may lead to a better cell yield and preservation on some smears than others and increase chances of obtaining at least one diagnostic sample. Taking care of the sample (drying quickly, not exposing to formalin fumes or water vapour, not loading into slide carriers while still wet) also results in better samples for assessment.

Be familiar with the charging structure of the external laboratory you send your slides to and make the most of it.

Even if you do not receive a definitive diagnosis with your aspirate of a lump, sometimes determining what it is *not* can be enough to help you manage your case, whether this is treatment or further diagnostics.

- If the sample is inflammatory in nature, be patient and spend time specifically looking for a cause
- If the sample yields tissue cells, ask yourself if the type of cell is appropriate for that anatomical location – knowing which cells are expected to be present helps you to spot interlopers
- The appearance of cells often signals their behaviour. Cells performing the same task usually look similar to each other. Wide variation may signal a loss of growth inhibition and should be regarded with suspicion
- Cells also warn of imminent or current proliferation with the presence of coarser chromatin, nucleoli and mitotic figures – marked increases in these in what should be a slow-growing tissue may not be appropriate

In short, screening cytology samples may save time and money by directing treatment and rationalizing further diagnostics.

## KEY LEARNING OBJECTIVES

- Pick the best sampling techniques for the aspiration of lumps and bumps
- Appreciate the common artefacts seen on cytology and how to avoid them
- Screen cytology samples for inflammatory and neoplastic processes

## MULTIPLE CHOICE QUESTIONS

1. Which of these is NOT associated with malignancy?
  - (A) Marked variation in cell size within a single population
  - (B) Uniformity of size within a cell population
  - (C) Marked variation in nuclear size within a single population
  - (D) Increased numbers of mitotic figures
2. Which of the following is NOT a cytology 'sin'?
  - (A) Staining a slide before you send out a sample to ensure that you have cells
  - (B) Placing the slides in a plastic slide container while they are still wet
  - (C) Placing the cytology slides in the same plastic bag as the histopathology samples
  - (D) Blowing on the slides to ensure quick drying
3. Which of the following is required to be certain that a cytology sample demonstrates a septic bacterial cause?
  - (A) Many different bacterial types being present
  - (B) A monomorphic population of bacteria being present
  - (C) Bacteria being present inside macrophages
  - (D) Bacteria being present inside neutrophils

# Cytology: don't forget the blood smear

**Kathleen Tennant**

Haematology in the practice or external laboratory involves the generation of numerical values and often graphs or scatter plots. Often these give a strong indication of underlying haematological abnormalities – however, there are still some clinically relevant findings which can only be identified on the blood smear.

Platelet counts through the machine are subject to many artefacts which may result in incorrect numerical

values. Assessing the smear can lead to a very different interpretation of what may initially appear to be a very thrombocytopenic sample.

Although many erythrocyte abnormalities do result in abnormal smear values, there are some which will be missed entirely without smear examination. An example of this would be the presence of red cell shear injury products, which might be caused by micro-angiopathic damage from underlying conditions, such as disseminated intravascular coagulation or abnormal small vessels in some neoplasms. The presence of Heinz bodies secondary to oxidative damage to erythrocytes can be seen on the routine smear, but is more obvious on a New Methylene Blue smear – not only does the presence of these suggest possible underlying pathologies (e.g. diabetic ketoacidosis, toxicity),

# Clinical pathology

but may also affect the haemoglobin measurement through the machine.

Leucocytes are counted by different machines using different methodologies, and while total counts are often reliable, differential leucocyte counts can be variable. Looking at the smear helps to confirm the presence of left shift and toxic change in neutrophils, allowing a full appreciation of the degree of demand for neutrophils. Abnormal nucleated cells present in the blood smear can be assessed for possible origin, although this is not always fruitful. Nucleated red cell precursors can be identified and counted differently in different machine types and being able to enumerate and assess these can avoid acceptance of a spurious leucocytosis.

Although unusual, some pathogens, can be seen on the blood smear. Although haemoplasmas are extremely difficult to identify, some larger organisms such as *Babesia* sp. can be demonstrated inside erythrocytes.

Assessing the smear is worthwhile where there are abnormalities in the machine values, and, where possible, in any clinically unwell animal to provide the full haematological picture and direct further management.

## KEY LEARNING OBJECTIVES

- Assess some changes in erythrocyte morphology and appreciate how these may signal underlying pathology
- Identify certain pathogens on the blood smear
- Use the smear to confirm or refute platelet measurements through the machine

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is true of a blood smear showing red cell regeneration?
  - (A) Neutrophils will also be left shifted
  - (B) Microcytosis will be visible in the red cells due to younger red cell precursors being present
  - (C) Larger, more basophilic red cells will be visible on the smear
  - (D) Nucleated red cells are always present
2. Which of the following is true of platelets?
  - (A) Very low counts through the machine will be due to clots in the sample and should be ignored
  - (B) Platelet clumps in the sample means that the animal definitely has adequate platelet numbers
  - (C) Larger platelets can be associated with platelet regeneration
  - (D) All Cavalier King Charles Spaniels have larger platelets and their platelet mass cannot be assessed
3. Which of the following is NOT a sign of toxic change in a neutrophil?
  - (A) A U-shaped nucleus
  - (B) Cytoplasmic basophilia
  - (C) Cytoplasmic vacuolation
  - (D) Doehle bodies in the cytoplasm

# Cytology: fluids

## Kathleen Tennant

Cytology of fluid samples can come with its own challenges. Depending on the cellularity and viscosity of the fluid, direct 'slide over slide' techniques may be appropriate for higher cellularity or thick samples, but in many cases a degree of concentration of the sample may be appropriate to ensure the best cell yield. Line preparations or sedimentation techniques can be employed where the cells are too fragile to concentrate easily in the centrifuge.

Drying slides made from fluids is best done quickly – thick, slow-drying preparations (such as synovial fluid placed into slide holder while still wet) can result in artefacts which can severely hamper assessment.

When assessing the smear, attention should be paid not only to the cells present but to the background as well. The first question should always be 'Is this slide of diagnostic quality?' If the cells are difficult to assess, it may be worth stopping and making another preparation.

Low-cellularity fluids with a transudative origin, whether pleural, peritoneal or cerebrospinal fluid (CSF)

can be challenging in terms of cell yield, but frequently have a limited number of cell types associated with them.

Addition of proteins or cells to fluids (e.g. in exudates) usually results in preparations which are easier to assess, but thicker areas should be avoided. If inflammatory cells are present, a careful search for possible causes is always worthwhile. As well as more obvious causes such as organisms in septic peritonitis/pyothorax, other causative substances such as bile pigment in biliary rupture can occasionally be seen on the smear. Degenerative change in neutrophils can occur with septic causes, but also with exposure to bile pigments, urine or pancreatic enzymes. It should be noted that neutrophils in septic synovial fluids rarely show degenerative change – and phagocytosed bacteria are extremely rarely noted.

Neoplastic populations can be easy to pick up in some conditions (such as large cell lymphomas), but may exfoliate poorly in others (e.g. haemangiosarcomas) and finding them requires patience.

The presence of reactive mesothelial cells in pleural, peritoneal and pericardial fluids can complicate the picture – these cells undergo changes which mirror criteria for malignancy, and it is often impossible to distinguish mesothelioma/carcinoma from a merely dysplastic, reactive population.



## KEY LEARNING OBJECTIVES

- Pick the best sampling, storage and preparation techniques for fluids
- Appreciate the common artefacts seen on fluid cytology and how to avoid them
- Screen fluid cytology samples for inflammatory and neoplastic processes

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is an acceptable way to handle fluids for cytological analysis?
  - (A) Make a direct preparation as well as a concentrated sample
  - (B) Routinely add a drop of formalin to fluid samples before making a preparation
  - (C) If there will be a delay in processing the sample, store in the freezer

- (D) If there will be a delay in processing, store on the bench side
2. Which of the following is required for a confident diagnosis of septic pyothorax?
  - (A) Bacteria seen in the background
  - (B) Bacteria adherent to squamous epithelial cells
  - (C) Bacteria inside macrophages
  - (D) Bacteria inside neutrophils
3. Which of the following would NOT be a criterion for malignancy in a mesothelial peritoneal fluid population?
  - (A) A population in regular sheets
  - (B) A population showing variation in size
  - (C) A population with multiple nucleoli present in most cells
  - (D) A population with uneven multinucleation

# When to test and when to treat?

**Ian Ramsey**

It is one of the perversities of life as a veterinary surgeon that the more experience of a particular condition that a clinician has, the cheaper the average total bill for that condition (author's unpublished observations). Some of this difference is the willingness of experienced clinicians to reduce the number and frequency of diagnostic tests, preferring to rely on therapeutic trials. Such trials are often highly effective management strategies. Preferring a treatment trial to a diagnostic test should not mean reducing the value placed on your time. The costs and benefits in treating dogs with a specific diagnosis need to be discussed with an owner before embarking on a therapeutic trial. Not all cases – even with a confirmed diagnosis – require treatment. Some cases may be monitored without treatment for months to years. Other cases may benefit from practical advice such as providing a dog-coat for dogs with non-pruritic alopecia.

Central to any discussion about treatment trials is to think about the necessity of diagnosis. Common presentations that do not usually require a diagnosis to be made include the first presentations of many acute clinical signs such as cough (without a heart murmur), vomiting, fever, diarrhoea, pruritis and stranguria. These presentations are noted for their ability to self-resolve, the availability of symptomatic treatment and one or two very common clinical causes. In contrast other presentations such as polyuria and polydipsia (PU/PD), yellow or white mucous membranes, ascites, abdominal masses and collapse do

require some investigation to ascertain likely diagnoses and/or prognosis. Usually such presentations have no 'symptomatic treatment' options, may require urgent surgical intervention, or multiple possible differential diagnoses some of which may be rapidly progressive.

Therapeutic trials have their limitations. If the first attempt is unsuccessful then repeating them is unlikely to work. Second and subsequent presentations of many of the above clinical signs require at least an attempt at diagnosis. Cytological analyses of aspirates from fluids and masses are probably the most diagnostically useful form of clinical pathology. In contrast, haematology in non-anaemic, non-pyrexical animals is probably the least likely to be diagnostic. Urinalysis is best done in-house, whereas non-urgent biochemistry is often best done in an external laboratory.

It has been shown by several studies in several diseases that the clinical signs of a condition are often the best monitoring tools available. The better the owner monitors the clinical condition of the patient then the fewer blood tests etc. are needed. Asking owners to record water consumption, the time taken to eat the food, the faecal quality in an objective or semi-objective way will help to reduce the uncertainty factor which encourages clinicians to perform additional blood tests.

## KEY LEARNING OBJECTIVES

- You will know a selection of case presentations that may be successfully managed without the use of diagnostic testing
- You will be able to develop a set of criteria for the assessment of any case to determine if diagnostic testing is likely to be productive
- You will appreciate the increased need for clinical monitoring with a reduction in diagnostic testing

## MULTIPLE CHOICE QUESTIONS

1. You are presented with an 8-year-old Cocker Spaniel with a 2-day history of frequent bilious vomiting, lethargy and anorexia. There is no history of toxin or foreign body ingestion. A detailed clinical examination only suggests mild abdominal pain and dehydration. Your laboratory offers a Vomiting Dog screen (consisting of blood urea nitrogen (BUN), creatinine, alanine aminotransferase (ALT), alkaline phosphatase, electrolytes, qualitative pancreatic lipase). How would you manage this case if the client had a limited budget?
  - (A) Don't test but rather treat with fluids, maropitant and pain relief for 24–48 hours and then reassess
  - (B) As in a. and submit samples for the Vomiting Dog screen
  - (C) As in a. and also perform diagnostic imaging but not clinical pathology
  - (D) As in a. and just perform an in-house qualitative pancreatic lipase
2. What is the most effective method of monitoring a 12-year-old Miniature Pinscher with diabetes?
  - (A) Clinical examination
  - (B) Fructosamine
  - (C) Glucose curve
  - (D) Owner monitoring of urination, thirst, appetite and weight
3. You are presented with a 9-year-old neutered female Doberman with a 2-day history of stranguria and the owner has noticed blood in the urine (which the dog is still able to pass in small volumes frequently). What is the most appropriate symptomatic treatment?
  - (A) Marbofloxacin and buprenorphine
  - (B) Amoxicillin and increased water added to the food
  - (C) N-acetyl glucosamine and hyaluronic acids
  - (D) A prescription diet formulated to regulate urinary pH and time

## Point-of-care meters

### Ian Ramsey

In the last 20 years many point-of-care (POC) meters have been introduced to the veterinary market. These differ from in-house biochemical analysers in offering a smaller range of tests that are designed to be taken to the patient, used repeatedly and provide near-instant results.

POC devices include meters not only for glucose (with which many primary care clinicians are already familiar) but also for blood gases, electrolytes, ammonia, lactate, haemoglobin, ketones, coagulation tests and many others. These devices often have their origins in human medical POC tests. Such devices are subject to statutory regulation in the human healthcare market ensuring that certain performance criteria are met. No such regulations exist within the veterinary market and therefore it is important that practices are aware of the performance characteristics of these devices, so they can interpret results from them effectively.

POC devices offer economies of scale that make individual tests much cheaper than conventional in-house or external laboratory testing. However, as they often only measure one parameter they are usually best seen as monitoring devices rather than diagnostic tools. Their convenience can be offset by a reduction in the quality of the results, but providing the quality is still sufficient then the immediacy of those results may be of significant clinical benefit. In some cases the quality of the results is a significant improvement on those available from in-house analysers (e.g. ammonia). In others the quality is better than existing alternatives (e.g. haemoglobin compared to the traditional spun packed cell volume).

These devices can be very accurate and reliable – but they can be inaccurate or, worse, inconsistent both between samples and when used repeatedly on the same sample. There are published papers in respected peer-reviewed journals on the performance parameters for some POC devices, however some POC devices have never been independently evaluated in the clinical setting and performance data are limited and hard to obtain. Veterinary practices need to know how their devices perform over time and wherever possible against other machines and clinical expectations.

These devices can be easy to use – and easy to use wrongly. Incorrect use may not produce error alerts. Instructions provided with the device are not always clear or well illustrated. Veterinary practices using such devices must therefore have clear training protocols (and it is good working practice to have a list of nominated trainers and who have been trained to use the device).

The convenience of POC testing will mean that the number and range of these devices is likely to increase in the future. Newer technologies will expand the range of tests available and the number that any one device can deliver.

## KEY LEARNING OBJECTIVES

- You will appreciate the current range, value and limitations of point-of-care (POC) meters with specific examples
- You will be able to develop protocols within your own small animal practice that ensure the optimal value and use of these meters
- You will be aware of the likely future for POC meters in small animal practice and be better prepared for their introduction in your working life

## MULTIPLE CHOICE QUESTIONS

- Which of the following tests is available on portable POC devices?
  - Bile acids
  - Ammonia
  - Liver enzymes
  - Bilirubin
- Which one of the following statements about the sensitivity of POC devices is correct?
  - Sensitivity is calculated by dividing the number of affected animals by the number of affected and unaffected animals in a population
  - Sensitivity is more important than specificity when considering a test that, if positive, will likely result in the euthanasia of an animal
  - Sensitivity is affected by the frequency of disease in a population and so needs to be determined in each population
  - Sensitivity increases the accuracy of the measurement of the analyte in question
- Why are traditional PCV measurements better than POC devices for haemoglobin in some primary care practices?
  - They produce less sharps and are therefore safer
  - They are less susceptible to operator error
  - They are a better indicator of the oxygen-carrying capacity of the blood
  - The senior partners still use the Fahrenheit scale and don't speak to doctors

## Small mammals

### John Chitty

Although haematology and serology will also be discussed in the talk, this is a basic guide to interpretation of biochemistries in small mammals (Figure 1).

Parameter	High	Low
Glucose	Very variable in an animal that 'continuously' feeds on high-carbohydrate foods. Not reliable enough to diagnose diabetes mellitus unless levels are persistently elevated and accompanied by persistent glucosuria. Even then it may simply reflect excessive feeding of simple carbohydrate. Glycosylated haemoglobin and fructosamine <i>may</i> assist Stress!!!! Pain!!! May allow assessment of pain	Important critical care parameter in moribund animals – hypoglycaemia may be accompanied by ketosis
Protein parameters – total, albumin, globulin	Similar interpretation to other mammals – ideally should be assessed by electrophoresis. Diet and husbandry play a major part in determining plasma albumin levels	Low albumin most likely to result from nutritional problems though liver or renal disease may play a part
Cholesterol/triglyceride	Potentially of great use given the frequency with which hepatic lipidosis is seen. However, diurnal rhythms and feeding changes make these hard to interpret (need to use fasted sample) However, in the anorexic rabbit elevated values and/or lipaemia can be important prognostic indicators	
Liver enzymes	Alanine aminotransferase (ALT) – sign of hepatocellular damage but not organ specific and has short half-life Aspartate aminotransferase (AST) – less specific and will rise with muscular exertion or tissue damage Gamma-glutamyl transferase (GGT) – biliary stasis. Also found in the kidneys but not always increased in renal disease Alkaline phosphatase (ALP) – nearly all tissues Glutamate dehydrogenase (GLDH) – specific but not very sensitive	

# Clinical pathology

Bile acids	Diurnal rhythm. Fasting samples not easily possible, so dynamic testing not likely Very high single samples may indicate hepatic dysfunction	
Urea	Renal disease (sensitive??) Also, prerenal – dehydration, water deprivation, cardiac disease, etc Also gut effects	Impaired hepatic function??
Creatinine	Renal disease – not very sensitive	
Calcium	Found as bound and unbound (ionized) forms. Values vary greatly compared to other species. High values not necessarily abnormal	Hypocalcaemic tetany seen in pregnant/lactating does. Must measure ionized form! Renal disease may cause raised or lowered levels of total calcium
Phosphate	May rise in renal disease	May fall in renal disease – effects dependent on diet
Electrolytes	Probably the same as in other mammals	Don't forget effects of anaesthesia and lipaemia In rabbits, sodium levels may be used as a prognostic indicator in gut stasis cases – lower levels are associated with a guarded prognosis

**Figure 1:** Interpretation of biochemistry results in small mammals

NB. *Guinea pigs*. Hyperthyroidism is well recognised in older animals showing weight loss and a rapid heart rate. Enlarged thyroids may be palpable. Normal ranges seem similar to cats, and measurement of total T4 is recommended in these cases.

In all species a euthyroid sick syndrome may be recognized. Hypothyroidism is rare in all these species.

## KEY LEARNING OBJECTIVES

- To understand blood sampling methods in small mammals
- To understand interpretation of biochemical and haematology parameters
- To understand use and possibilities of faecal, urinary and bacteriology sampling in small mammals

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is CORRECT about serology?
  - (A) Provides information regarding exposure to infectious agents
  - (B) Confirms infection with an agent as cause of disease

- (C) Confirms an animal will show signs of that disease in the future
  - (D) Guarantees the animal is not a carrier of that disease
2. Which of the following is CORRECT about a glucose level  $>30$  mmol/l in a rabbit?
    - (A) Confirms that surgery is needed in a gut stasis case
    - (B) Suggests that obstruction of the gut is a strong possibility
    - (C) Is of no help at all in determining severity of disease in these cases
    - (D) Confirms that fluids and analgesia are all that will be required in this case
  3. A rabbit is sneezing. What does the finding of *Pasteurella* spp. from an adult rabbit nasal swab show?
    - (A) This rabbit has pasteurellosis
    - (B) Is of no significance – *Pasteurella* is a commensal
    - (C) Should only be interpreted in the light of radiological and cytological findings
    - (D) Means the rabbit should be isolated from other rabbits

# Reptiles and Birds

## John Chitty

Clinical pathology is an essential tool in exotic pet medicine. While it can only ever be an aid to diagnosis rather than diagnostic in its own right, the generalized signs with which these animals are often presented and their ability to hide signs, means that 'tools' other than physical examination and history are helpful.

Good reliable results depend on many factors.

- Correct sample taking. Sites for sampling of birds and reptiles will be discussed as will the need for sedation/anaesthesia and handling techniques. The volumes suitable for collection will be discussed as will choices of tests for very small samples. In summary, the following sites are generally used:
  - birds – right jugular vein, brachial vein, caudal tibial vein;
  - chelonians – jugular vein, dorsal tail vein, subcarapacial vein, brachial vein;
  - lizards – ventral tail vein, heart;
  - snakes – ventral tail vein, heart
- Good-quality samples. Correct anticoagulant selection and sample handling are vital
- Choice of laboratory. As a minimum, in-house laboratories should be able to check packed cell volume (PCV), glucose, electrolytes, ionized calcium and cytology. External laboratories should be selected on the basis of experience with exotics' haematology, interest in exotics and range of tests available
- Choice of tests. Few tests have been evaluated in all the species that may be seen. In many cases tests used in other species are 'applied' to exotics. In addition, few 'normals' using large numbers of individuals have been generated. As such, choice of test and interpretation of results can be difficult
  - In all cases, full haematology is essential and often provides more information than biochemistries
  - Protein assessment is also extremely useful though it is recommended that electrophoresis is used to measure this as it is not only more accurate (especially in birds where a pre-albumin fraction may confuse differentiation of globulins) but provides an assessment of any inflammatory response
  - Electrolytes should be measured (sodium, potassium, chloride, ionized calcium) wherever possible and may be done patientside or on a spun heparin gel sample

- Similarly, total calcium and phosphorus assessment are required in many cases
- Creatinine kinase (CK) is often included as a marker of tissue damage, as many of the liver enzymes (e.g. aspartate aminotransferase (AST), lactate dehydrogenase (LDH)) are non-specific to liver, comparison to CK may assist in determining whether an enzyme rise is due to hepatocellular damage or tissue damage
- Beta-hydroxybutyrate (especially chelonians), cholesterol and triglycerides are often used to assess nutritional state and risk of hepatic lipidosis

## KEY LEARNING OBJECTIVES

- Understand sampling methods in birds and reptiles
- Understand interpretation of biochemical and haematology parameters
- Understand use and possibilities of faecal, urinary and bacteriology sampling in birds and reptiles

## MULTIPLE CHOICE QUESTIONS

1. You have a 2-year-old grey parrot showing twitching and neurological signs. You suspect hypocalcaemia. Which test is most likely to be diagnostic?
  - (A) Total calcium
  - (B) Total calcium + phosphate
  - (C) Ionized calcium tested patientside
  - (D) Ionized calcium tested at an external laboratory using posted spun serum
2. A faecal sample from a healthy Mediterranean tortoise reveals some ciliated protozoa and a number of flagellates. What is the significance of this?
  - (A) These are a potential cause of diarrhoea and metronidazole should be given
  - (B) These are a potential cause of diarrhoea and probiotics should be given
  - (C) These are normal commensals
  - (D) The tortoise may be infectious to others
3. What is the significance of azurophils in snakes?
  - (A) Raised in chronic inflammatory conditions, analogous to monocytes in mammals
  - (B) Artefact
  - (C) Part of the acute inflammatory response
  - (D) Of no significance in interpretation



Friday 5 April  
Hall 5

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# Dentistry

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- 356 08:30–09:15  
**Odontogenic tumours**  
Philippe Hennet
- 357 09:25–10:10  
**Jaw opening and closing disorders**  
Philippe Hennet
- 358 11:05–11:50  
**Flap techniques in palatal surgery**  
Philippe Hennet
- 359 12:00–12:45  
**Mandibular fracture repair considerations**  
Alexander Smithson
- 360 14:05–14:50  
**Oral masses in cats: inflammatory or neoplastic?**  
Philippe Hennet
- 361 15:00–15:45  
**Feline chronic stomatitis: a frustrating and debilitating disease**  
Philippe Hennet
- 362 16:50–17:35  
**Periodontal therapy**  
Alexander Smithson
- 363 17:45–18:30  
**Feline extraction techniques**  
Alexander Smithson

## Odontogenic tumours

Philippe Hennet

Odontogenic tumours (OT) are tumours derived from ectomesenchymal and/or epithelial tissues that constitute the tooth-forming apparatus. Odontogenic remnants that may develop into cysts, tumours and hamartomas include rests of Serres, rests of Malassez and reduced enamel epithelium. The same way as occurs during normal tooth development (odontogenesis), inductive interactions between the oral epithelium and the underlying odontogenic ectomesenchyme may occur during development of an OT. These interactions may lead to formation of tooth-like mineralized material.

### CLASSIFICATION

OT represent a heterogeneous group of lesions of diverse clinical behaviour and histopathological types, ranging from hamartomatous lesions to malignancy. OT are divided in two categories according to their biological behaviour, benign and malignant, and further divided based on which cellular component (epithelial, ectomesenchymal, mixed) gives rise to the tumour and on the presence of induction of mineralized tooth-like material within the tumour. The new 2017 World Health Organization (WHO) classification has brought some changes (reincorporation of odontogenic cysts) but confirms this general classification. A veterinary WHO classification system was proposed in 2003. Although OT found in humans and animals shows similarities, the veterinary classification system includes entities which do not have exact counterparts in humans (amyloid-producing odontogenic tumour (APOT), feline inductive odontogenic tumour). However, a recent retrospective German study analysing 250 OT in dogs and cats has shown that four of the 12 entities could be classified according to both WHO classifications of OT. Seven and two of the 12 entities could only be classified according to the current human WHO classification and veterinary WHO classification, respectively. A revision of the 2003 WHO classification is therefore needed.

### PREVALENCE IN DOGS AND CATS

In a recent German retrospective study, a total of 1390 canine and 317 feline oral tumours were reviewed. Eighteen percent ( $n = 250$ ) of the canine and 3.2% ( $n = 10$ ) of the feline oral tumours proved to be of odontogenic origin. They could be divided into 12 different entities. The odontogenic fibroma was the most common canine ( $n = 167$ ) and feline ( $n = 4$ ) OT. The second most common OT for dogs was ameloblastoma ( $n = 74$ ) and that for cats was ameloblastic fibroma ( $n = 2$ ).

In a 2018 USA retrospective study, results of oral histopathological diagnoses showed a prevalence of 34% (138/403) of OT in dogs and 3% (2/73) in cats. Peripheral odontogenic fibroma (POF) was the most common OT (52%) followed by canine acanthomatous ameloblastoma (CAA) (40%).

In another study of 152 oral tumors of possible odontogenic origin, CAA accounted for 45% and POF for 31% of the histopathological diagnoses. Other OT identified included APOT, ameloblastic carcinoma, complex odontoma, compound odontoma, desmoplastic ameloblastoma, odontogenic carcinoma and ontoameloblastoma.

### KEY LEARNING OBJECTIVES

- Explain the embryological basis of the development of odontogenic tumours
- Name the biological behaviour of the most predominant odontogenic tumour
- Recall the appropriate treatment of odontogenic tumours

### MULTIPLE CHOICE QUESTIONS

1. Which answer is NOT correct regarding the development of odontogenic tumours?
  - (A) They originate from ectomesenchymal and/or epithelial tissues that constituted the tooth-forming apparatus
  - (B) They are located at the periphery of the bone in the gingival tissue
  - (C) They may incorporate tooth-like mineralized material
  - (D) They may have epithelial or ectomesenchymal cellular components, or both
2. Which answer is NOT correct regarding canine acanthomatous ameloblastoma (CAA)?
  - (A) It is mostly observed on the rostral aspect of the mandible
  - (B) It is a benign tumour
  - (C) It is mostly located on the gingival margin with limited bone involvement
  - (D) It has been wrongly named in the past an acanthomatous epulis
3. Which answer is CORRECT regarding feline inductive odontogenic tumour?
  - (A) It is a uncommon benign tumour mainly observed on the mandible
  - (B) It is a uncommon benign tumour affecting cats of all ages
  - (C) It is an uncommon odontogenic tumour of epithelial origin rarely invading bone
  - (D) It is an uncommon, benign, locally invasive neoplasm primarily observed in young cats



# Jaw opening and closing disorders

**Philippe Hennet**

Inability to fully open or close the oral cavity is a disorder that can be easily identified clinically but which may be due to various causes interfering with the biomechanics of the jaws.

## CLINICAL PRESENTATIONS

Disorders affecting mouth opening/closing may arise from dental, osteoarticular and soft tissue causes. Disease processes affecting mouth opening are more frequent than those affecting mouth closing. Clinical examination helps differentiate between both. Trismus (restricted mouth opening) is most frequently due to a painful local condition resulting in a constriction of the masticatory muscles. In specific cases, a systemic cause may also be identified. Clinical examination under general anaesthesia is mandatory to help determine whether the restricted opening is transitory or permanent. Aetiological diagnosis may require blood tests, tissue biopsy, electrodiagnostic tests and diagnostic imaging (radiographs, computed tomography (CT) or magnetic resonance imaging (MRI)).

## OSTEOARTICULAR DISEASES

### Craniomandibular osteopathy (CMO)

This inherited condition, affecting mainly West Highland White Terriers, usually occurs in young dogs (3–8 months of age) as a painful ventral mandibular bony swelling, which can extend to the temporomandibular joint (TMJ) and tympanic bulla. The condition is self-limiting and resolves in most dogs at the age of 1 year.

### Temporomandibular joint diseases

Any TMJ trauma (luxation/fracture) may lead to mouth opening or mouth closing disorders. Trauma, and less commonly infection or tumours, may also further lead to TMJ ankylosis.

### Jaw fractures

Pain, displacement of bony parts and subsequent malocclusion may prevent normal mouth opening/closing.

### Coronoid process displacement

This condition mostly occurs in Basset Hounds and setters. Due to muscular dysfunction and abnormal TMJ anatomy, the coronoid process (tip of the ramus) is displaced laterally during opening and closure of the jaw. At the time of closure, the coronoid process may hit the ventral border of the zygomatic arch or move lateral to it, thus preventing full closure of the mouth, which appears locked.

## SOFT TISSUE CONDITIONS

### Muscular diseases

Masticatory muscles are particular as myosin fibres are of a different type than other muscles, type-2M fibres. A specific immune-mediated condition, named masticatory muscle myositis (MMM), specifically affects this group of muscles and results in progressive closure of the mouth and impossibility to open it, even with anaesthesia.

### Trigeminal neuropathy

Clinical presentation is a dog with inability to close its mouth. It appears as a dropped mandible. The mandible is flaccid and can be moved but the dog is not able to hold it. Usually no other neurological signs are present. The exact aetiology is unknown although trauma to the trigeminal nerve is likely.

### Infections

Infection in the oral cavity, especially in the caudal area, but also in the pharyngeal, orbital and retro-orbital areas, may induce pain, swelling and restriction in mouth opening due to the space-occupying lesion. Orbital cellulitis of dental origin and wood stick penetration are some of the recognized conditions.

### Tumours

Tumours of the mucosa or connective tissue may restrict jaw mobility because of pain, fibrosis or space-occupying lesion.

## DENTAL DISEASES

Pain and soft tissue swelling associated with infections as well as tooth displacement associated with trauma or mobile teeth, secondary to periodontitis and bone loss, or may prevent normal mouth opening/closing.

## SYSTEMIC CAUSES

Tetanus is the most common systemic cause that can interfere with mouth opening. As there is no specific test, diagnosis is based on the specific clinical presentation and on the exclusion of other neuromuscular causes.

## KEY LEARNING OBJECTIVES

- Understand the biomechanics of jaw opening/jaw closing
- Select the appropriate examination to confirm the cause of the condition
- Understand the treatment of the various causes

## MULTIPLE CHOICE QUESTIONS

- Which masticatory muscle is only involved in jaw opening?  
(A) Digastricus (C) Pterygoid  
(B) Masseter (D) Temporalis
- Which answer is CORRECT regarding craniomandibular osteopathy?  
(A) It is the consequence of trauma at a young age in very active dogs  
(B) It is a precancerous lesion that may lead to the development of osteosarcoma in small-breed dogs

- It is an autosomal recessive inherited condition, mostly affecting young West Highland White Terriers
- It is an immune-mediated condition secondary to severe dental disease in middle-aged dogs
- Which condition does NOT affect jaw opening?  
(A) Lateral coronoid process displacement  
(B) Retro-orbital inflammation/swelling  
(C) Trigeminal paralysis  
(D) TMJ ankylosis

## Flap techniques in palatal surgery

### Philippe Hennet

Different surgical techniques (palatorrhaphy) may be used for midline defects. Usually, the palatal defect is closed with soft tissue. Palatal axial pattern flaps are used. Direct vascularization of the flap is from the major palatine artery exiting on the medial surface of the maxillary fourth premolar tooth. With congenital defects, no effort is made to create an osseous partition between the nasal and oral cavities, although techniques involving bone graft have been described. With recent traumatic injuries, one can attempt to close the bony midline defect with an intraosseous ligature.

### TRANSLATION (MODIFIED VAN LANGENBECK TECHNIQUE) AND ROTATION (VEAU-WARDILL-KILNER TECHNIQUES) FLAPS

An incision is made along the cleft margins, lateral incisions are made along the dental arches on both sides and the mucoperiosteum is elevated from the palatal shelves and displaced medially in translation. Care is taken not to sever the major palatine artery exiting on the palatal side of the fourth maxillary premolar tooth. The mucoperiosteum is sutured in one or two layers (use of nasal mucosa flaps – four-flap technique – as a first layer).

When mobilization of the flap is needed, large U-shaped pedicled grafts centred on the palatine artery are made on both sides of the defect. The flaps are displaced by rotation medially and caudally. The disadvantage of these techniques is that the suture line is located above the bony defect, which is more likely to be associated with dehiscence. A submucoperiosteal graft (e.g. auricular cartilage) can be used to provide some underlying support for the flaps and favour retention of the blood clot. The advantage of the technique is that very little maxillary bone (hard palate) is left uncovered, decreasing the likelihood of abnormal facial growth or bone necrosis.

## OVERLAPPING FLAP TECHNIQUE

This consists of an upsidedown rotation flap technique based on the palatine artery. On one side, two transverse incisions are made at the most rostral and the most caudal extent of the defect and an incision is made along the dental arch allowing free dissection of the mucoperiosteum from the palatal shelf up to the border of the defect. Care is taken not to lacerate the mucoperiosteum at this level as it will be used as the hinge for rotation of the flap. On the other side, an incision is made along the cleft and the mucoperiosteum dissected over a few millimetres. The flap is rotated upside down and the free end is introduced under the mucoperiosteum on the other side of the cleft. Sutures are placed over the bony edge on this side of the cleft. By doing this, the connective tissue surface of the flap, and the palatine artery, are exposed in the oral cavity. This technique gives very predictable results in various types of palatal defects (congenital or traumatic). A side effect of the technique is that a large part of the palate is left exposed and heals by second intention within weeks. This type of healing on a large part of the hard palate may lead to abnormal palatal development in young animals.

## KEY LEARNING OBJECTIVES

- Locate the main vascularization of the palate
- Enumerate the basic principles of flap surgery in the oral cavity
- Describe the surgical procedure

## MULTIPLE CHOICE QUESTIONS

- Which answer is CORRECT regarding the vascularization of the palate?  
(A) The major palatal artery exits caudal to the last maxillary molar and runs rostrally along the midline  
(B) The minor palatal artery plays an important role in the vascularization of the rostral part of the palate  
(C) The facial artery, not the palatine artery, is the major vessel providing blood to the hard palate

- (D) The major palatine foramen in the dog is located halfway between the palate midline and dental arcade at the level of the distal root of the fourth maxillary premolar
2. Which answer is NOT correct regarding the principles of palatal flap surgery?
- (A) The mucoperiosteal flap can be stretched because of its elastic property
- (B) Large flaps should be harvested even for small defects
- (C) Axial pattern flaps based on the major palatal artery are preferred

- (D) Rotation flaps allow more displacement than translation flaps
3. Which is the correct answer regarding the upsidedown overlapping flap?
- (A) An incision is made along all margins of the defect to achieve clean free edges
- (B) The upsidedown flap is sutured over the opposite mucoperiosteal mucosa
- (C) The upsidedown flap is rotated along one of the margin of the defect to act as an hinge
- (D) The upsidedown flap is rotated inside the defect and sutured to the nasal mucosa

# Mandibular fracture repair considerations

## Alexander Smithson

Orofacial trauma frequently results in mandibular fracture. It is important to know how to efficiently and effectively deal with these cases when they present in practice and at A&E centres. Emergency case assessment is fundamental; a systematic approach then applied to the non-emergency and stable patient helps confidence in dealing with these cases.

## INVESTIGATION

Extraoral and intraoral X-ray imaging, and computed tomography (CT) scan, aid identification of injuries. Whilst all have particular strengths and uses, CT enables a much higher proportion of abnormalities to be more easily diagnosed. Each injury can thus be assessed and triaged, with consideration given to pain and complications anticipated.

In addition to mandibular fracture, temporomandibular joint (TMJ) injury, soft tissue trauma and dental or dental-alveolar compromise is common. Thorough appraisal of all injuries guides treatment. It is important to assess the dentition thoroughly to ensure that healthy teeth which may contribute to stabilization, occlusion and return to function are maintained, whilst diseased teeth likely to frustrate healing are eliminated. Injuries such as fracture, intrusion, luxation and avulsion may be found.

## TREATMENT

A variety of mandibular fixation techniques exist. Some are more suitable than others in certain situations. Knowledge of the treatment options and ability to select the most appropriate treatment is key to success in mandibular fracture cases. This must also be weighed along with patient, client and operator factors, for example comorbidities and available funds. It is unusual for a mandibular fracture to exist in isolation, without concomitant injury,

thus a variety of techniques may be necessary for each patient. Ultimately the simplest, least invasive approach, most likely to give success on first application, and ideally with the lowest associated cost, is ideal. This is not always possible, however, and familiarity with techniques aids appropriate selection. Wire and acrylic minimally invasive techniques are a useful addition to the arsenal available. Selecting technique and its application to ensure occlusion is critical.

## KEY LEARNING OBJECTIVES

- Select and assess investigations to identify injuries
- Select appropriate stabilization techniques in common mandibular fracture cases
- Understand key factors in mandibular fracture repair to avoid complications

## MULTIPLE CHOICE QUESTIONS

1. Which factor is unlikely to predispose to jaw fracture?
- (A) Tooth discoloration
- (B) Large root size
- (C) Periodontitis
- (D) Tooth abscess
2. Which area is most likely to be injured when placing mandibular symphyseal cerclage wires?
- (A) Caudal mental foramen
- (B) Middle mental foramen
- (C) Mandibular foramen
- (D) Infraorbital foramen
3. Which technique does NOT aid reduction and stabilization of a mandibular fracture in correct occlusion?
- (A) Transmylohyoid intubation
- (B) Acrylic application primarily to the buccal aspect of mandibular teeth
- (C) Acrylic application primarily to the lingual aspect of mandibular teeth
- (D) Acrylic trimming

## Oral masses in cats: inflammatory or neoplastic?

**Philippe Hennet**

Cats quite frequently develop conditions resulting in enlargement of oral or perioral tissues with a soft or hard consistency. These conditions may share similar clinical features, which can lead to a wrong diagnosis unless thorough clinical examination is followed by diagnostic imaging and histopathology. Because both benign dental diseases and cancerous lesions, such as squamous cell carcinoma, are frequently encountered in the feline oral cavity, early and thorough assessment is essential in achieving the correct diagnosis.

### DIAGNOSTIC APPROACH

#### Signalment and history

Some disease processes are more likely to occur in young animals (pyotraumatic mucosal lesions, feline inductive odontogenic tumour) whereas others more frequently affect older ones (malignant tumours). Breed is seldom a criterion of importance. History of previous recurrent diseases is to be taken into account as well as the rate of growth of the lesion.

#### Extraoral examination

Facial structures, including lymph nodes, are palpated to assess the consistency and the presence of pain on palpation. Nostrils and nasal airflow are inspected to assess potential nasal involvement and the eyes are assessed for potential periorbital diseases.

#### Intraoral examination

This includes assessment of both mucosal surfaces and teeth. Any mass or bump must be clinically evaluated for its size, location pertaining to gingival or other oral mucosae, consistency (soft, fluctuant, firm, hard), appearance (smooth or irregular surface, ulcerative or proliferative). A thorough clinical dental examination is performed using a dental probe and dental explorer.

#### Cytology and histopathology

Cytology and/or histopathology are ways of achieving true diagnosis. Most of the time biopsy followed by histology is the preferred means. Cytology may be complementary to biopsy to evaluate lymph nodes (fine-needle aspiration) and superficial masses (exfoliation cytology).

#### Diagnostic imaging

Dental radiography is an essential diagnostic tool for assessing dental-related lesions. Masses localized along the dental arch or along the palate are suitable diagnostic imaging. Depending on the lesion's localization, its

potential extent and on the presumptive diagnosis following clinical examination, dental radiographs, skull radiographs, computed tomography (CT) scan or magnetic resonance imaging (MRI) may be indicated to assess the lateral and deep extents of the mass, loco-regional extent and distant metastasis.

### CLINICAL CONDITIONS

#### Eosinophilic granuloma complex

This may be found in cats in the perioral area (indolent ulcer on the maxillary lip facing the canine teeth and eosinophilic granuloma of the mandibular lip appearing as an enlarged 'chin') and in the oral cavity (lingual, sublingual mucosa, palatal or pharyngeal mucosa).

#### Pyotraumatic mucosal lesions

Chronic traumatic lesions of the oral mucosa, especially in the sublingual area or on the alveolar mucosa, may appear as red proliferative or ulceroproliferative lesions.

#### Dental-related lesions

Dental resorptive lesions are frequently encountered in cats. Dental infections due to pulpal necrosis or periodontitis, as well as tooth root resorptive lesions, may be associated with alveolar/jaw bone osteomyelitis. Clinically, a suppurative or non-suppurative appearance can be observed together with soft tissue swelling and bony changes.

#### Oral tumours

Oral tumours comprise almost 10% of all tumours encountered in the cat, and the mouth is the third site of tumours after the haemolymphatic system and the skin. Squamous cell carcinoma is the most prevalent tumour and accounts for about 70% of oral tumours in cats. Other tumours comprise odontogenic tumours and fibrosarcoma.

### KEY LEARNING OBJECTIVES

- Understand the diagnostic approach to oral masses in cats
- Select the appropriate examination to confirm the cause of the condition
- Understand the treatment of the various causes

### MULTIPLE CHOICE QUESTIONS

1. Which strategy is NOT appropriate when facing a non-healing extraction socket in a cat?
  - (A) Take a dental intraoral radiograph to assess for tooth root remnant
  - (B) Perform a biopsy if proliferative and/or ulcerative tissue is present at the site of extraction
  - (C) Change the antibiotic treatment based on culture and sensitivity

- (D) Take an intraoral radiograph or perform a CT scan to evaluate bony changes at the site of extraction
2. Which is the most common oral neoplasm in cats?
- (A) Ameloblastoma  
(B) Fibrosarcoma  
(C) Giant cell tumour  
(D) Squamous cell carcinoma
3. Which answer is NOT correct regarding pyotraumatic mucosal lesions?

- (A) This lesion is usually observed on the alveolar mucosa buccal and/or distal to the mandibular first molar
- (B) Most of these lesions resolve with surgical excision and extraction of the maloccluding/interfering tooth
- (C) Extraction of the maloccluding/interfering tooth alone may allow spontaneous healing of the lesion in some patients
- (D) Most of these lesions recur as they are precancerous lesions, leading to carcinoma transformation

# Feline chronic stomatitis: a frustrating and debilitating disease

**Philippe Hennet**

Feline chronic gingivostomatitis (FCGS) is a syndrome clinically characterized by pain on eating and/or opening the mouth, pawing at the mouth, dysphagia, weight loss, poor general condition, grooming deficiency, ptyalism and sometimes bleeding from the mouth.

## HYPOTHETICAL CAUSE

FCGS is considered a multifactorial condition resulting from an inappropriate individual response to chronic antigenic oral stimulation of bacterial and viral origins. Chronic oral carriage of calicivirus is thought to play a role in cats presenting with caudal stomatitis. Other factors acting on the host's immune response may exacerbate the expression of clinical lesions. Dental-related conditions, including periodontal disease and, possibly, dental resorption, are chronic inflammatory processes which may play a role.

## DIAGNOSIS

FCGS is a condition where inflammation extends beyond the mucogingival line to the alveolar mucosa and retro-molar area (caudal stomatitis) and is not related to the intensity of periodontal disease. Dental radiographs allow the identification of the extent of periodontitis and of the presence of dental resorptions. Biopsy of the mucosa should be performed when the appearance, the extent or the severity of the lesion is unusual (to rule out neoplasia, e.g. carcinoma). Polymerase chain reaction (PCR) technology can be used to identify oral calicivirus/herpesvirus carriage.

## TREATMENT

### Dental extraction

Various treatments have been advocated for this condition. Most of them have been aimed at reducing the inflammatory process, decreasing discomfort and allowing better nutrition. The current therapeutic approach to chronic gingivitis/stomatitis with chronic caudal stomatitis is to eliminate all sources of infection and chronic inflammatory processes from the mouth in order to facilitate the action of body's defence system against calicivirus. The results of dental extraction in calicivirus-positive cats with chronic caudal stomatitis can be summarized as follows: 50–60% of cats are cured, 25–30% are markedly improved and about 15% are totally non-responsive.

### Antibiotics

The most commonly used drugs include co-amoxiclav, clindamycin, doxycycline and metronidazole. They are mostly used to decrease oral secondary infection and subsequent antigenic stimulation.

### Pain killers

Opioids and non-steroidal anti-inflammatory drugs (NSAIDs) are used in the peri- and postoperative periods.

### Anti-inflammatory drugs

Glucocorticoids can be used but high dosage are best avoided in calicivirus-positive or herpesvirus-positive cats. A tapering 3-week course can be prescribed. As far as possible, it is better to use NSAIDs for inflammation control in calicivirus-positive cats. When insufficient effect is observed, minimum dose (to effect) of corticosteroids may be used.

### Supportive therapy

Vitamins, fatty acids and specific food for critical care patients are used as necessary. Tube feeding can be done through an oesophageal tube after surgery for the most debilitated cats but is rarely necessary.

### Immunomodulating drugs

Recent randomized double-blind controlled-studies have shown that a daily oral administration of a diluted

# Dentistry

dose of feline recombinant interferon omega and daily administration of ciclosporin had a significant effect on cats with refractory cases of chronic caudal stomatitis (not improved after extraction) compared to control. Additionally, preliminary studies on mesenchymal stem cells have shown very encouraging results.

## KEY LEARNING OBJECTIVES

- Summarize the aetiopathogenesis of the condition
- Explain the rationale for treatment of the condition
- Understand the outcome of treatment

## MULTIPLE CHOICE QUESTIONS

1. Which lesion is typical of feline chronic gingivostomatitis?  
(A) Ulcerative gingivitis  
(B) Lingual ulcerative lesions  
(C) Caudal stomatitis  
(D) Dental resorptive lesions
2. Which answer is CORRECT regarding feline chronic gingivostomatitis?  
(A) It is the consequence of active bacterial infection in feline immunodeficiency virus (FIV)-positive immunodeficient cats

- (B) It is the consequence of the cytopathological effect of *Bartonella* sp. infection in cats
- (C) It is an immune-mediated allergic condition in domestic cats exposed to industrial food and antiparasitic drugs
- (D) It is an immune-mediated inflammatory condition mediated by various causes among which oral bacteria and viruses play a role

3. Which answer is NOT correct regarding treatment of feline chronic gingivostomatitis?  
(A) Full-mouth extractions are mandatory as studies have shown that only extracting cheek teeth is insufficient  
(B) Best results require dental extractions to be performed  
(C) Immunomodulating drugs, such as feline recombinant interferon omega and ciclosporin, have been shown to play a role in the control of refractory cases after dental extractions  
(D) The type of antibiotic and anti-inflammatory drugs has not been shown to have an influence on the severity of the lesion

# Periodontal therapy

## Alexander Smithson

It fundamental to understand that plaque is a soft biofilm and major causative factor of periodontal disease. Calculus is mineralized plaque and does not cause periodontal disease, but is a predisposing factor as it is a rough, plaque-retentive material.

Scaling, whether by hand, sonic or ultrasonic equipment, is used to remove calculus. Several aims are achieved:

- Teeth are made fully visible to the operator for assessment
- Areas of plaque trapping and stagnation are reduced
- The smooth enamel surface is easily cleaned, assisting homecare (tooth-brushing)
- The water spray irrigates the area, removing debris
- Plaque biofilm disruption

However small particles of adherent calculus remain on the tooth surface, creating a more plaque-retentive surface than clean enamel.

The aims of polishing are:

- Create a smooth tooth surface by removal of calculus fragments
- Mechanically disrupt the plaque biofilm

Thus, both scaling and polishing are methods of biofilm disruption; if no calculus is present, polishing may be more appropriate. Biofilms require mechanical disruption for

removal – their organized adherence sequence and matrix makes them highly resistant to other forms of removal and antimicrobials.

Unfortunately scaling and polishing both pose potential risks:

- Scratching and roughening of the enamel surface
- Thermal pulpitis

Where a client is willing and able to brush their pet's teeth, polishing has a useful role in reducing plaque retention (via smoothing) and thus assisting homecare, oral hygiene and ultimately periodontal health. However, if no homecare will be performed, the potential risks inherent to polishing, in addition to time under general anaesthesia to polish the teeth and its associated financial cost, likely outweigh the possible benefits. It could be argued that where no calculus exists and an owner is willing to brush, they will disrupt the biofilm themselves once brushing at home. To achieve periodontal health, plaque removal is required on a daily basis; without daily tooth-brushing following a scale and polish procedure, benefit is transient and largely cosmetic.

## KEY LEARNING OBJECTIVES

- Understand the role of plaque and risk factors in periodontal disease
- Understand when and how to perform safe and effective periodontal therapies
- Know what works – select effective oral hygiene regimes for canine and feline patients



## MULTIPLE CHOICE QUESTIONS

- Which factor is least likely to predispose to periodontal disease?
  - Overcrowding
  - Diabetes
  - Wet food
  - Plaque accumulation
- Which statement is UNTRUE regarding periodontitis?
  - Periodontitis is reversible

- Periodontitis is irreversible
  - Periodontitis is caused by plaque
  - Periodontitis is attachment loss
- Which statement is UNTRUE regarding 0.12% chlorhexidine gluconate oral rinse?
    - Should be used at a different time to brushing with toothpaste
    - Should be used at the same time as brushing with toothpaste
    - May cause tooth stain
    - Has a substantive effect

# Feline extraction techniques

**Alexander Smithson**

Feline dentistry is frequently performed but can be highly frustrating; the small size and fragility of cats' teeth, compounded by pathologies, predispose to difficulty and complications. This lecture aims to assist veterinary surgeons in their approach to the problems encountered in practice and how best to select extraction techniques.

## INVESTIGATION

Thorough examination of cases, along with the addition of appropriate tests – most notably intraoral X-ray imaging – enables identification of normal anatomy and diagnosis of pathology. The findings are assessed both in terms of need to extract and potential difficulty. This enables treatment planning; consideration of treatment need, treatment options and, where extraction is elected, the optimal technique to be selected.

## EQUIPMENT

Feline patients require a number of specially selected items of equipment to aid efficiency of extraction. Since most equipment has its origins in the human field much is more suitable for larger dogs with bigger teeth than those of cats. Creation of a dedicated feline extraction kit keeps optimum instruments immediately to hand. Appropriate instruments must be kept in good working order – sharpening is essential and can reduce potential for complications due to slippage.

## EXTRACTION TECHNIQUE

Whilst extraction technique is typically divided into simple (closed) and surgical (open), a number of technique elements are involved in each. These elements form an arsenal from which individual techniques are selected, hybridized and combined to best suit a particular case. Patient, client and operator factors should be evaluated. Patient factors can then be more closely inspected to

focus on each tooth requiring extraction, and selection of the optimum technique. Further, differences in technique may be required on a per root basis. Variance in normal tooth anatomy dictates the approach (for example differences between an upper and lower canine and upper and lower molar). Pathologies such as tooth resorption greatly influence technique; the type of pathology, location and severity must be considered.

Prevention of complications is key, and risks with specific dentition are considered. Examples include oronasal communication and lip trauma in upper canine extraction and jaw fracture in lower canine extraction. Root fracture is a common complication in all cases and avoidance relies on use of only sufficient force, applied at the correct speed and in the correct direction.

## KEY LEARNING OBJECTIVES

- Assessment of clinical and radiographic findings to select extraction technique
- Select the appropriate extraction technique and equipment for feline cases
- Understand how to apply extraction technique elements for optimal efficacy in cats

## MULTIPLE CHOICE QUESTIONS

- What cases may be appropriate for crown amputation?
  - Advanced periodontitis
  - Advanced type 1 tooth resorption
  - Advanced type 2 tooth resorption
  - Pulp necrosis
- What is NOT a typical complication of upper canine extraction?
  - Oronasal communication
  - Mandibular fracture
  - Lip trauma
  - Flap dehiscence
- Which of the following is TRUE about use of extraction forceps?
  - Should never be used
  - Should first apply apical pressure
  - Should first apply traction
  - Should have two-point contact





Friday 5 April  
Hall 6

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# Recent graduates

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- 366 14:05–14:50  
**Tooth extraction**  
Alexander Smithson
- 367 15:00–15:45  
**Pale, bruised, bleeding: what's going on?**  
Dan Batchelor
- 368 16:50–17:35  
**Is this murmur significant?**  
Ruth Willis
- 369 17:45–18:30  
**How to manage cases that aren't going well**  
Dan Batchelor

## Tooth extraction

### Alexander Smithson

Dentistry forms a large proportion of most surgical lists yet can be difficult and frustrating. Anatomy of our patients, combined with many pathologies, predispose to difficulty and complications. This lecture aims to guide your approach to cases in practice and enable extraction technique selection.

### INVESTIGATION

Appropriate case examination requires the addition of appropriate tests – most notably intraoral radiographs – to both identify normal anatomy and diagnose pathology. Examples of common pathologies in general practice include:

- Gingivitis
- Periodontitis
- Stomatitis
- Oral masses
- Tooth fracture
- Discoloured teeth
- Luxation
- Caries
- Tooth resorption

In addition to the multiple pathology types, their location and severity or grade typically influence treatment options, timing and technique. Findings must be assessed on multiple levels to enable treatment planning; this includes:

- Treatment need
- Treatment options
- Potential difficulty
- Optimal technique

### EQUIPMENT

Equipment selection is key to effective extraction. Hand and power instruments are required in order to perform extractions and knowledge of how to identify these and how best to use them is critical. Surgical instruments must be kept in good working order – sharpening and sterilization are essential and can reduce potential for complications.

### EXTRACTION TECHNIQUE

Extraction technique may be divided into simple (closed) and surgical (open); a number of technique elements are

involved in each. These elements form an arsenal from which individual techniques are selected, hybridized and combined to best suit a particular case and tooth or even individual root. Ultimately practical experience in a wet-lab environment is optimal to learn and gradually improve upon technique for the variety of tooth anatomy encountered in our patients.

Patient, client and operator factors should be evaluated:

- Patient factors – age, comorbidities, tooth pathology
- Client factors – wishes, treatment options, financial
- Operator factors – experience, time and equipment available

Most essentially, informed consent must be obtained in order to protect patients, clients and veterinary staff.

### KEY LEARNING OBJECTIVES

- Understand key clinical and radiographic findings to identify pathology and treatment options
- Select appropriate extraction technique
- Understand key elements of informed consent in dentistry cases (how to avoid serious issues if it goes wrong!)

### MULTIPLE CHOICE QUESTIONS

1. What is involved in closed extraction technique?  
(A) Alveolus widening and periodontal ligament breakdown  
(B) Soft tissue flap elevation  
(C) Bone window formation  
(D) Bone gutter formation
2. Extraction is most appropriate in a fractured tooth in which of the following circumstances?  
(A) Periodontitis is present  
(B) Root canal treatment is possible  
(C) Complicated lower canine fracture is present  
(D) Uncomplicated lower canine fracture is present
3. Which of the following is true about extraction forceps?  
(A) Should never be used  
(B) Should only be used on the root  
(C) Should first apply traction  
(D) Should have two-point contact

# Pale, bruised, bleeding: what's going on?

**Dan Batchelor**

Haemostasis involves three overlapping phases: primary haemostasis, secondary haemostasis and fibrinolysis. Primary haemostasis refers to interactions between platelets, von Willebrand factor (vWF) and the blood vessel wall, leading to formation of a platelet plug. Clinical features that suggest a primary haemostatic problem include petechiae/ecchymoses, bleeding from mucous membranes (e.g. epistaxis, melaena) and oozing from small wounds (in contrast, subcutaneous haematomas, muscle/joint bleeds, or body cavity haemorrhage suggest a disorder of secondary haemostasis). Petechiae and ecchymoses are most commonly seen with severe thrombocytopenia (platelet count  $<30 \times 10^9/l$ , although this can vary). They can also be seen with platelet function defects (thrombopathias) and vasculitis. Von Willebrand disease (VWD) tends to present with mucosal bleeding or excessive bleeding following surgery rather than petechiation/ecchymosis.

Thrombocytopenia is usually a result of platelet destruction (e.g. immune-mediated thrombocytopenia, IMTP), lack of platelet production (bone marrow problem) or platelet consumption (either in disseminated intravascular coagulation (DIC) or vasculitis). Platelet sequestration in splenomegaly can lead to thrombocytopenia but the count is rarely  $<100 \times 10^9/l$  and it is the least likely cause of severe thrombocytopenia. Platelet loss after acute haemorrhage can lead to thrombocytopenia but this is rarely severe, so if an animal presents with severe bleeding and severe thrombocytopenia, the low platelets should be considered the problem not the consequence. Thrombocytopenia is commonly spurious, so a machine count should be verified on a blood smear: 1 platelet/hpf is equivalent to about  $15 \times 10^9/l$ . Healthy animals should have 10–30 platelets/hpf. The smear should also be checked for platelet clumps.

IMTP is considered the most common cause of severe thrombocytopenia in dogs. IMTP may be primary, or secondary to an underlying disease. Diagnosis of primary IMTP is presumptive, based on exclusion of known causes of thrombocytopenia, exclusion of underlying diseases and response to immunosuppressive treatment. The recommended approach includes history (including vaccinations, drugs), clinical examination, haematology including smear, biochemistry, urinalysis, clotting times (helps rule out DIC), diagnostic imaging, testing for tick-borne disease, and ideally bone marrow aspirate/biopsy. Treatment is with glucocorticoids along with supportive treatment and management of any underlying disease, if present. Vincristine and intravenous immunoglobulins have been suggested based on a small number of studies, but there is not enough published evidence to be

able to make firm recommendations about management of IMTP.

VWD is the most common of the hereditary bleeding disorders seen in dogs. It should be suspected with dogs that show mucosal bleeding or excessive bleeding following surgery but have normal platelet count and normal clotting times. A prolonged buccal mucosal bleeding time would be expected. Diagnosis is made by measuring plasma vWF antigen.

Thrombopathia should be suspected when there are signs of a primary haemostatic problem but normal platelet count, normal clotting times and normal plasma vWF antigen. Platelet dysfunction can occur secondary to systemic problems such as uraemia or hyperproteinemia. Hereditary function problems, such as Glanzmann thrombasthenia and others, are recognized in several breeds.

## KEY LEARNING OBJECTIVES

- List the clinical signs that indicate a problem of primary haemostasis
- List the common causes of thrombocytopenia
- Describe how to investigate a case presenting with petechiae or ecchymoses

## MULTIPLE CHOICE QUESTIONS

1. A dog presents with ecchymosis of the skin over the ventral abdomen and is passing black tarry faeces. What type of clotting problem is most likely to be present?
  - (A) Accelerated fibrinolysis
  - (B) Disseminated intravascular coagulation
  - (C) Disorder of primary haemostasis (e.g. thrombocytopenia)
  - (D) Disorder of secondary haemostasis (e.g. anticoagulant rodenticide ingestion)
2. You are considering the possibility of von Willebrand disease in a 6-month-old female Doberman prior to ovariohysterectomy. What screening test is most appropriate?
  - (A) Buccal mucosal bleeding time
  - (B) Coagulation panel (prothrombin time (PT) and activated partial thromboplastin time (aPTT))
  - (C) Platelet count and blood smear
  - (D) Screening is unnecessary here because von Willebrand disease is X-linked: clinical bleeding is only seen in males
3. Which drug commonly used in cancer chemotherapy is associated with an increase in platelet count?
  - (A) Carboplatin
  - (B) Cyclophosphamide
  - (C) Doxorubicin
  - (D) Vincristine

# Recent graduates

## Is this murmur significant?

Ruth Willis

Auscultation of a heart murmur during routine examination raises suspicion of underlying heart disease. Further investigation may be indicated and this is likely to be guided by history, clinical examination findings and also the owner's wishes.

### PHYSIOLOGICAL MURMURS

Physiological murmurs may be detected at any age and are not associated with underlying structural heart disease. These murmurs tend to be soft (grade 1–2/6), timing may be early systolic or intermittent, and the murmur is localized to the left cranial heart base.

### CONGENITAL MURMURS

Congenital heart murmurs are more commonly detected in puppies than in kittens and it can be challenging to differentiate pathological and physiological murmurs. Even with severe congenital heart disease, clinical signs may not always be apparent. Continuous and diastolic murmurs are highly likely to be significant and echocardiography is indicated. In patients where the murmur is loud, radiates widely and is either holo- or pansystolic, echocardiography is advisable to determine cause and significance.

### ADULT CATS

In adult cats, the incidence of heart murmurs is relatively high – around 30%. Differentiating physiological from pathological murmurs purely on the basis of auscultation in cats is challenging and approximately half of all cats with murmurs will have structural heart disease identified on echocardiography. The presence of a gallop rhythm is concerning, as gallop sounds are commonly associated with significant heart disease causing diastolic dysfunction.

### ADULT DOGS

Auscultation of a murmur during a routine examination should alert the clinician to the presence of heart disease. Further investigation is likely to be indicated but the tests selected and interpretation of results depend on the clinical situation. In a small-breed adult dog, a left apical systolic murmur is likely to be attributable to degenerative mitral valve disease. In these cases if cardiac size is normal then no treatment is indicated, however if there is cardiac enlargement and/or referable clinical signs then further treatment is advisable. Cardiac chamber dimensions are most accurately measured using echocardiography but thoracic radiographs can also be useful to assess overall cardiac shape and size and also to assess the pulmonary vessels and lung pattern.

In contrast, in large- or giant-breed dogs, a new murmur raises the suspicion of dilated cardiomyopathy. In these cases, further investigations such as echocardiography are helpful to confirm the diagnosis and ambulatory electrocardiogram (ECG) monitoring may also be required to assess the frequency and severity of arrhythmias.

In cases where the patients do not fit into these categories, further investigation regarding the cause of the murmur is always warranted.

### KEY LEARNING OBJECTIVES

- Be able to recognize the characteristics of an innocent heart murmur in dogs
- Know when further investigations are appropriate
- Know which cases are likely to benefit from treatment

### MULTIPLE CHOICE QUESTIONS

1. In dogs a physiological murmur is likely to be which of the following?
  - (A) Loud, continuous murmur that radiates widely
  - (B) Soft, short, systolic murmur localized to the left cranial heart base
  - (C) Soft, short, diastolic murmur localized to the right cranial heart base
  - (D) Loud, systolic murmur with point of maximal intensity at the left apex
2. A soft, intermittent, systolic left apical murmur is detected in an asymptomatic adult cat. Echocardiography does not reveal evidence of significant structural heart disease. Which is the best diagnosis and treatment advice?
  - (A) Physiological murmur, no treatment required
  - (B) Preclinical hypertrophic cardiomyopathy, start diltiazem
  - (C) Physiological murmur, start anti-thrombotic therapy
  - (D) Systolic anterior motion of the mitral valve, start atenolol
3. According to the ACVIM staging system for myxomatous atrioventricular valve disease, what does stage B2 in a dog describe?
  - (A) Asymptomatic, has an acquired heart murmur caused by atrioventricular valve regurgitation but normal cardiac chamber dimensions
  - (B) Symptomatic with clinical signs referable to congestive heart failure and cardiac enlargement
  - (C) Asymptomatic, has an acquired heart murmur caused by atrioventricular valve regurgitation and an increase in left atrial and left ventricular dimensions
  - (D) Asymptomatic and no audible murmur but at risk of developing the disease

# How to manage cases that aren't going well

**Dan Batchelor**

There is a reason that we speak in terms of 'practising medicine'! We are faced with the challenge of working out what is wrong with an animal who cannot speak to us, who may be trying to attack us, and who belongs to a human or humans who may have multiple complex expectations and demands. We are expected to diagnose and treat the problem, often on a limited budget, and are expected to do it quickly. There may not even be much known about the disease in question, or, worse, what we think we know may be wrong. Considering all this it's no surprise that, as in other areas of life, things don't always go to plan. It can seem overwhelming to any new or experienced graduate. Some suggestions:

- Don't forget the core skill of taking a thorough history – this is a skill like any other and will get better with practice. Often the key to the case is in the clinical history. Try and maintain a client-focused approach – understanding what their main concern is really helps
- Remember the importance of the physical examination: another vital skill, often overlooked. No amount of expensive testing can compensate for things missed on the physical examination. As with history-taking, practice is essential
- For complex cases, use the 'problem-oriented approach'; taking a short-cut by 'pattern spotting' can lead to trouble. If you have a suspected diagnosis but the animal is not responding to appropriate treatment, going back to your original problem list and differential lists is often best. Be prepared to revise your diagnostic plan
- Choose your diagnostic tests in a logical order and in the right context. Help your laboratory give you useful answers by giving them good samples and providing them with relevant clinical details. Understand what you hope to achieve by each test: what you hope to rule out, and what you hope to rule in. Don't run multiple tests indiscriminately
- Don't necessarily try and explain everything with one theory – the animal may have two or more diseases
- Don't feel you have to solve every case immediately – nobody can know everything. Talk through cases with

peers and colleagues. Know where to look for extra information, and call for advice if necessary. Consider referral if the owner is up for it

- Remember that many cases will get better regardless of what you do – avoid overtreatment and avoid polypharmacy. Also remember that many cases will do badly or get worse no matter what you do – depressing but sadly true
- We are all human and mistakes can happen. Most client dissatisfaction comes from poor communication so keep your communication skills up and get training if necessary. Always be totally honest with owners, keep good records, warn about complications and get informed signed consent for all interventions. When using drugs, especially off-label, get consent and read the data sheet

## KEY LEARNING OBJECTIVES

- Explain the problem-oriented approach to diagnosis in small animal practice
- List the resources for additional information to assist in managing difficult cases
- List the most common reasons for errors in veterinary practice

## MULTIPLE CHOICE QUESTIONS

1. What is the most common reason for litigious complaints in small animal practice in the UK?
  - (A) Problems arising from anaesthetic complications
  - (B) Problems arising from medical treatment
  - (C) Problems arising from parturition
  - (D) Problems arising from surgery
2. What is the most important component of the investigation of a dog or cat that is unwell?
  - (A) The clinical history
  - (B) Blood sample for haematology
  - (C) Blood sample for biochemistry profile
  - (D) Radiographs of chest and abdomen
3. What is the first rule of medicine?
  - (A) All vomiting stops eventually
  - (B) Do no harm
  - (C) Keep testing until you find the answer
  - (D) Things can always get worse



Friday 5 April  
Kingston Theatre

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# RCVS Knowledge

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- 372 08:30–09:00  
**How good are you and can you prove it?**  
Chris Gush
- 373 09:10–10:10  
**How to apply best evidence to manage and care for epilepsy patients in daily clinical practice**  
Paul Pollard and Holger Volk
- 373 11:05–11:50  
**Research into small animal practice: why evidence matters**  
Peter Denys Cockcroft
- 374 12:00–12:45  
**Learning from a rabbit anaesthetic death: an evidence-based approach to rabbit anaesthesia in practice**  
Pam Mosedale and Molly Varga
- 375 14:05–15:45  
**First do no harm: how systems can reduce the rate of morbidity and mortality by 50%**  
Richard Byrne, Richard Killen and Laura Playforth
- 376 16:50–17:35  
**Reliable care in the NHS: building safer systems in a just culture**  
Margaret Mary Devaney

## How good are you and can you prove it?

**Chris Gush**

All veterinary surgeons and veterinary nurses strive to provide the best possible care for the animals in their care. They take responsibility for the care they provide to patients, and for their clinical and professional non-clinical practice.

The Code to Professional Conduct and its associated Guidance state that it is the responsibility of every veterinary surgeon and veterinary nurse to be undertaking clinical governance activities. Clinical governance is described by the RCVS as a continuing process of reflection, analysis and improvement in professional practice for the benefit of the animal patient and the client owner. But what does this practically mean for veterinary teams and what can we learn from what is happening in the NHS?

Quality improvement in the NHS has been described as, 'The combined and unceasing efforts of everyone ... to make the changes that will lead to better patient outcomes (health), better system performance (care) and better professional development (learning)' (*BMJ Quality & Safety* 2007;16:2-3). All these aims are linked and relevant in veterinary care, the challenge is to balance them.

A framework from the Institute of Medicine defines six domains of healthcare quality.

- Safe: avoiding harm to patients
- Effective: providing evidence-based care and refraining from providing services that are unlikely to be of benefit
- Patient-centred: ensuring that care is responsive to individual patient preferences, needs and values
- Timely: reducing waiting times for care and avoiding harmful delays
- Efficient: avoiding waste
- Equitable: ensuring that care is of the same quality regardless of personal characteristics such as gender, ethnicity, location or socioeconomic status

With an expansion to 'patient-centred' to include the client, each of these domains is applicable to the delivery of veterinary care and can be used to start to measure a quality service. In this session Chris Gush, Executive

Director of RCVS Knowledge, will share his NHS background to show why continuous quality improvement is crucial for animal health and welfare and for every member of the veterinary team. He will discuss the broader concept of quality and present practical tools for veterinary teams to use with the very limited amount of time that they have and will go into more detail about how veterinary teams can begin to unlock the benefits of continuous quality improvement.

### KEY LEARNING OBJECTIVES

- Provide a critical analysis of the factors that have led to a greater international emphasis on quality measurement and improvement in healthcare
- Identify a range of approaches, tools and strategies to quality improvement, and critical success factors
- Understand how to plan, develop and evaluate a test of change on a small scale in veterinary practice

### MULTIPLE CHOICE QUESTIONS

1. What is a core concept of quality improvement?
  - (A) Quality is improved by repeating the same activity again and again
  - (B) Develop a good team
  - (C) Everything can be improved
  - (D) Perfection can be achieved
2. What does quality improvement seek to improve?
  - (A) Individual work habits
  - (B) Processes
  - (C) Leadership styles
  - (D) Organizational culture
3. How does quality improvement encourage accountability?
  - (A) Enabling employees to facilitate change in company processes
  - (B) Asking for individuals to inform supervisors when they have done something wrong
  - (C) Blaming individuals for mistakes with processes
  - (D) Forcing accountability at every step of a process, even if there is no action



# How to apply best evidence to manage and care for epilepsy patients in daily clinical practice

**Paul Pollard and Holger Volk**

Evidence-based veterinary medicine (EBVM) is one of the three core pillars for good clinical practice. The other two pillars should also not be ignored, as they are of equal importance. The most questioned one is 'clinical expertise', which if used in extreme has also be named 'eminence-based veterinary medicine'. Clinical expertise, however, is important as it will help to translate effectively the information from publications to daily clinical practice and back. It will provide the reading-frame to ensure group effects seen in well designed studies can be applied to the individual patient. The last pillar, which is the owner's understanding and value system, is often forgotten and not yet sufficiently researched in veterinary medicine. Evidence and clinical expertise are of limited value for the patient's care if the information is not communicated effectively to the owner. Bad compliance will limit the effect of treatment significantly. In this presentation, we will use case examples of patients with epilepsy to discuss how we can create synergy between the three core factors of good clinical practice.

We will discuss the difference between statistical significance and clinical significance. The placebo and the regression to the mean effect is around 30%. This means that an epilepsy management option needs to provide at least a 30% improvement before an effect can be noted clinically. Considering this, we will discuss how the current published systematic reviews and meta-analysis can be used in clinical practice. It is essential that clinicians evaluate both effectiveness of treatment and tolerability before tailoring it to the individual patient. Currently, phenobarbital is likely to be the first-line medication for feline patients with epilepsy, followed by levetiracetam

and imepitoin. In dogs, phenobarbital and imepitoin, as well as potassium bromide, are likely to be effective and relatively safe for the treatment of idiopathic epilepsy. For some of the medications we have good evidence, but for other treatments, combination therapy and especially in cats the evidence is less good. We will discuss how to overcome this gap in knowledge in clinical practice and have a discussion of how to improve this in the future. Further studies are crucial in order to establish guidelines for every eventuality. However, saying this we have made great progress in recent years and this will be highlighted in the presentation.

## KEY LEARNING OBJECTIVES

- To consider how to evaluate the evidence base for epilepsy
- To understand the value of clinical guidelines in applying that evidence
- To understand the interplay between the different factors to ensure good clinical practice

## MULTIPLE CHOICE QUESTIONS

1. What are the three core factors influencing good clinical practice?
  - (A) Evidence-based veterinary medicine
  - (B) Clinical expertise
  - (C) Owner's understanding and values
  - (D) All of the above
2. With regard to epilepsy, when reading a paper, the treatment effect needs to be at least how large to be considered clinically significant?
  - (A) 50%
  - (B) 40%
  - (C) 30%
  - (D) 20%
3. What is the percentage of dogs with idiopathic epilepsy which will respond adequately to treatment in first-opinion practice?
  - (A) 15–29%
  - (B) 30–49%
  - (C) 50–69%
  - (D) 100%

# Research into small animal practice: why evidence matters

**Peter Denys Cockcroft**

There is often a considerable time delay in the outcomes of clinical research being translated into clinical practice

and decisions are not always made based upon the best current evidence for the case specific context. The terms 'research into practice', 'science into practice', 'from publication to patient' or 'just-in-time learning' and 'bridging the gap' are sometimes used to describe evidence-based veterinary medicine. The process has been defined in a number of ways with one of the simplest being 'the use of current best evidence in making clinical decisions'.

An understanding of the meaning of scientific evidence and how this is expressed is critical when translating science into practice. This presentation will explore

the nature and meaning of scientific evidence. The paper will discuss what the strength of evidence of a study is how it can be expressed. Measures that are used to capture clinical significance will be presented.

Knowledge summaries, which are published in the *Veterinary Evidence Journal*, are short critical summaries of the best available evidence for a defined clinical question. They provide a concise conclusion. The process used to identify and classify the strength of evidence when generating knowledge summaries will be described. Small animal examples will be described.

In an ideal world there would be a checklist of the full range of important information needs when managing a specific case. The current best evidence for the checklist would be available as a framework or cluster of knowledge summaries presented in an accessible and appropriate structure to inform decision making. This case-specific cluster of knowledge summaries provides the practitioner with a one-stop shop for all aspects of the case management in a framework that is aligned to the process of case management.

Small animal examples of the knowledge cluster framework will be described. Once complete the cluster of 'knowledge summaries' can be compiled into a decision-support framework and published in a visual format with links to the appropriate knowledge summaries within the journal.

## KEY LEARNING OBJECTIVES

- To be able to define the term 'strength of evidence' when applied to a scientific study
- To understand which measures can capture the utility of the evidence
- To understand the process which underpins the knowledge summary bottom line

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is a measure of the 'strength of evidence' when applied to a scientific study when two treatments are compared?
  - (A) The magnitude of the difference identified by the study
  - (B) The magnitude of the statistical difference identified by the study ( $p$ -value)
  - (C) The quality of the design and implementation of the study
  - (D) The number of animal used in the study groups
2. Which one of the following statements is TRUE regarding the statistical difference of a scientific study which compares two treatments?
  - (A) A statistical difference measures the magnitude of the difference in outcomes
  - (B) No significant difference indicates there is no difference between the treatment outcomes
  - (C) A statistical difference indicates the treatment outcomes are different
  - (D) A statistical difference indicates the probability of the treatment outcomes being different
3. What is a knowledge summary?
  - (A) It is a literature review of the primary published papers on a topic
  - (B) It summarizes the current best scientific evidence for a specific information need
  - (C) It provides a list of primary published papers on a topic
  - (D) It provides a summary of the knowledge on a given topic

## Learning from a rabbit anaesthetic death: an evidence-based approach to rabbit anaesthesia in practice

**Pam Mosedale and Molly Varga**

Many practitioners find the prospect of anaesthetizing a rabbit daunting, particularly if an adverse event has previously occurred. This presentation will look at all aspects of rabbit anaesthesia and present the evidence base behind creating protocols.

Through the use of a case study, the session will show how one practice reacted to an anaesthetic death

and used a significant event audit to analyse why the death happened and how they could improve their systems of work to avoid making the same mistake again. By discussing their mistakes supportively and without judgement, with a commitment to openness and understanding rather than discipline and blame, this practice was able provide support for their team and advocate for the needs of their patients.

The case study will show how root cause analysis can help a practice to consider the human factors, system factors and patient factors in reducing avoidable death. It will consider husbandry prior to anaesthesia, handling and accommodation before and after procedures, suitable equipment, analgesia, fluid therapy, anaesthetic drugs and anaesthetic monitoring.

Because rabbits are a prey species that tend to mask symptoms of disease and distress, they need to be treated in a different way to dogs and cats. Empathetic and achievable evidence-based care will be the core of this presentation, showing a practical approach for busy veterinary teams to include a consideration of the best available evidence in an afternoon's consultations.

## KEY LEARNING OBJECTIVES

- To learn how to use significant event audit to improve systems of work in practice
- To learn how to use evidence-based medicine to make safe and practical decisions about rabbit anaesthesia
- To learn how to monitor the changes made to show if they have improved patient outcomes

## MULTIPLE CHOICE QUESTIONS

1. The results of a significant event should NOT do which of the following?
  - (A) Identify CPD and training needs
  - (B) Draw up or alter protocols or guidelines after considering the evidence base
  - (C) Blame the individual concerned
  - (D) Lead to planning further outcome or process audits

2. When is the most common time for anaesthetic deaths to occur?
  - (A) On induction
  - (B) During the surgical procedure
  - (C) Once the surgical procedure has finished
  - (D) During the 48 hours directly after anaesthesia
3. Which of the following statements is NOT applicable to rabbit anaesthesia?
  - (A) Rabbits can hide ongoing medical issues – a preanaesthetic blood sample can help to reveal these
  - (B) Rabbits have a very narrow trachea, and therefore intubation is not indicated
  - (C) Rabbits in gut stasis rapidly develop electrolyte abnormalities which can affect the safety of an anaesthetic
  - (D) Comprehensive analgesia is required for all surgical procedures – it is anaesthetic sparing and prevents the patient being flooded with pain on recovery

# First do no harm: how systems can reduce the rate of morbidity and mortality by 50%

**Richard Byrne, Richard Killen and Laura Playforth**

Members of the veterinary team are dedicated and passionate about the quality of care we provide to our patients. In our world, nothing is black or white, which leads us all to develop skills in critical problem solving and innovation. Therefore, the areas in which improvements can be made and the systems we establish are as diverse as the individuals who strive to make them.

Our discussion aims to show this diversity in action with examples of how improvement systems have been implemented in different settings, in order to demonstrate the benefits which can be achieved, and the lessons that can be learnt in the process.

In addition to internal team-led systems, some of the many pre-existing resources will be discussed, which can be applied or modified to suit differing circumstances. There's no point in reinventing the wheel when you don't have to!

In this session, each of the speakers will provide you with practical examples of how they are supporting their colleagues to overcome barriers and to engage with quality improvement. This will be followed by an open discussion between the speakers and delegates.

No matter what size your team – from the largest groups to the smallest independent practices – there will be a system or a process change that you could apply in your setting which can drive significant and meaningful improvements.

## KEY LEARNING OBJECTIVES

- To be introduced to a wide range of quality-improvement strategies to help you get started in your practice
- To consider key benefits and challenges of establishing successful systems
- To understand the importance of all team members setting and engaging with a culture which facilitates continual improvement in practice

## MULTIPLE CHOICE QUESTIONS

1. What success levels can be achieved using some quality-improvement methods?
  - (A) Up to 10% reduction in morbidity and mortality
  - (B) Up to 25% reduction in morbidity and mortality
  - (C) Up to 33% reduction in morbidity and mortality
  - (D) Up to 50% reduction in morbidity and mortality
2. How long does it usually take to get a new process embedded within the team?
  - (A) Around 1 month
  - (B) Around 3 months

- (C) Around 6 months
  - (D) Around 12 months
3. What is the most important prerequisite for a successful quality-improvement implementation?

- (A) Significant financial resources
- (B) A fully staffed team
- (C) A proactive learning culture
- (D) Senior manager involvement

## Reliable care in the NHS: building safer systems in a just culture

**Margaret Mary Devaney**

People make errors. Errors can cause accidents. In healthcare, errors and accidents result in morbidity and adverse outcomes and sometimes in mortality. Seeking out errors and identifying the 'responsible individual' can often result in punitive actions. This approach does not solve the root of the problem, and without changing the system this may not only perpetuate the problem, rather than solving it, it can also produce emotional and sometimes professionally life-changing consequences.

A healthy learning system is characterized by its ability to self-reflect and identify strengths and defects, both in real time and in periodic review intervals. In healthcare, this entails leaders highlighting the importance of continuous reflection to assess performance. It entails consistently performing agreed-upon team behaviours and values. Strong learning systems identify defects and act on them; they reward proactivity rather than reactivity. Learning, and a healthy safety culture, reinforce one another by identifying and resolving clinical, cultural, and operational defects.

A safe care system needs to collect productive investigative data that can be analysed and acted upon to improve patient safety. This process is not possible unless members of the organization remain vigilant and mindful and maintain continuous surveillance. Similarly, people within the organization must believe that they are required to report errors. However, institutions cannot afford a totally blame-free culture; deliberate reckless errors do warrant disciplinary action. Finding an organizational balance between actual or perceived punishment and actual or perceived blamelessness is the goal of developing a just culture. A just culture balances the need for an open and honest reporting environment with the end of a quality learning environment and culture. While the organization has a duty and responsibility to employees (and ultimately to patients), all employees are held responsible for the quality of their choices. Just culture requires a change in focus from errors and

outcomes to system design and management of the behavioural choices of all employees.

### KEY LEARNING OBJECTIVES

- To understand the importance of creating psychological safety, recognizing the risk of second victims
- To understand how to guard a safety learning system based on transparency and candor
- To know how to ensure value alignment: applying organizational values to every decision made

### MULTIPLE CHOICE QUESTIONS

1. Which of the following does psychological safety require?
  - (A) Early identification of who is to blame for incidents and ask them to change
  - (B) Spending lots of money to support staff
  - (C) Fostering trust to create an environment of non-negotiable respect, ensuring that people feel their opinions are valued, and any negative or abusive behaviour is swiftly addressed
  - (D) The team to avoid confrontational conversations
2. Which of the following does a learning safety culture require?
  - (A) Training individuals the same information again
  - (B) E-mailing reminders of local policy to staff
  - (C) Continuous reflection to assess performance against best evidence and associated behaviours
  - (D) Formal training for all in Health and Safety
3. Which of the following does a just culture require?
  - (A) Strict disciplinary actions for individuals involved in safety incidents
  - (B) Dismissing information that challenges personal preference
  - (C) A movement of focus from errors and outcomes to system design and management of the behavioural choices of all employees
  - (D) Acceptance that you cannot change the culture

## Section VI

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# Open To All Streams

Saturday 6 April

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Saturday 6 April  
Hall 1

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# Critical care

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- 380 08:30–09:15  
**Basic introduction to the use of blood gases**  
Dan Lewis
- 381 09:25–10:10  
**Advanced blood gas analysis**  
Dan Lewis
- 382 11:05–11:50  
**Techniques for oxygen therapy**  
Dan Lewis
- 383 12:00–12:45  
**Nutrition in critical care**  
Isuru Gajanayake
- 384 14:05–14:50  
**Approach to diabetic ketoacidosis**  
Sophie Keyte
- 385 15:00–15:45  
**Emergency management of urethral obstruction**  
JD Foster
- 386 16:50–17:35  
**Acute kidney injury**  
JD Foster
- 387 17:45–18:30  
**Management of canine acute pancreatitis**  
Isuru Gajanayake

## Basic introduction to the use of blood gases

Dan Lewis

This presentation will outline a standard approach to acid–base blood gas interpretation applicable to and useful in the vast majority of cases.

Before discussing this approach, we must revise some chemistry concepts: an *acid* is defined as a molecule that will donate a proton/hydrogen ion; a *base* is the opposite – a molecule that will accept a proton; and a *buffer* is a molecule that can either accept or donate protons/hydrogen ions from its environment. Finally, remember that pH is the negative base 10 logarithm of  $[H^+]$  – the hydrogen ion concentration. This means that a solution with pH 6 has 10 times the number of hydrogen ions ( $1 \mu\text{mol/l}$ ) as a solution of pH 7 ( $0.1 \mu\text{mol/l}$ ).

Why worry about  $[H^+]$  anyway? For their mass, hydrogen ions are highly charged and therefore potentially very reactive. Most metabolic processes depend upon enzymes – proteins – that are, in turn, dependent upon their structure and shape to function effectively. Large changes in the acidity of their environment runs the risk of altering enzyme and therefore cellular function, potentially leading to cell death.

The next concept to grasp is that alterations in the acid–base balance in the body have two origins – respiratory (actually ventilatory) and metabolic (everything else!). The respiratory side is solely determined by the level (partial pressure) of  $\text{CO}_2$  in solution – the  $\text{PCO}_2$ . As metabolic rate does not usually change much from minute to minute, the  $\text{CO}_2$  level in the body is controlled by ventilation and is an ‘open system’. This means that according to the chemical reaction:



the body can convert excess acid ( $\text{H}^+$ ) into  $\text{CO}_2$  and breathe it out. This means that the respiratory side usually functions as a very effective, rapid counterbalance for acid–base changes driven by metabolic processes.

The metabolic side can affect acid–base balance in two main ways: either by generating extra molecules that are acids/bases, for example lactic acid production during anaerobic exercise, or by causing the loss of a normal component of the buffering system, for example gastrointestinal loss of bicarbonate in diarrhoea. Whilst metabolic disturbances will sometimes cause very important alterations in  $[\text{HCO}_3^-]$ , the close relationship with ventilation means that  $\text{HCO}_3^-$  is *not* an independent variable, and therefore cannot be relied upon to tell you about the metabolic side.

Remember also that these metabolic processes are constantly occurring, and that large numbers of buffer molecules are present in intra- and extracellular fluids to enable the body to cope, most of the time.

So having obtained your sample, run it through the blood gas analyser and examine the results:

1. Check the pH
2. Check the  $\text{pCO}_2$
3. Check the patient for ventilatory abnormalities
4. Check the metabolic side
  - (A) Check the base excess (BE)
  - (B) If there is a metabolic acidosis, check the anion gap; if there is a metabolic alkalosis, check the chloride
5. Check the patient for metabolic abnormalities
6. Review the overall picture

### KEY LEARNING OBJECTIVES

- To understand how respiratory acidoses/alkaloses are created
- To understand how metabolic acid–base changes are identified, and the most likely clinical conditions that drive such abnormalities
- To appreciate the concept of compensatory acid–base changes and when these occur in patients

### MULTIPLE CHOICE QUESTIONS

1. A patient presents with a  $\text{PCO}_2$  of 52 mmHg and a blood pH of 7.25. What would this be described as?
  - (A) Respiratory acidosis caused by hyperventilation
  - (B) Respiratory acidosis caused by hypoventilation
  - (C) Respiratory alkalosis caused by hyperventilation
  - (D) Respiratory alkalosis caused by hypoventilation
2. What are the three most common causes of metabolic acidosis in dogs?
  - (A) Ethylene glycol, lactate and hypochloraemia
  - (B) Azotaemia, lactate and hypernatraemia
  - (C) Azotaemia, lactate and ketoacidosis
  - (D) Ethylene glycol, ketoacidosis and hypochloraemia
3. A patient has a blood pH of 7.36, base excess  $-7 \text{ mmol/l}$  and  $\text{PCO}_2$  24 mmHg. What is the most likely explanation?
  - (A) Primary metabolic acidosis with compensatory respiratory alkalosis
  - (B) Primary metabolic alkalosis with compensatory respiratory acidosis
  - (C) Primary respiratory acidosis with compensatory metabolic alkalosis
  - (D) Primary respiratory alkalosis with compensatory metabolic acidosis



# Advanced blood gas analysis

Dan Lewis

The 'standard' approach to acid–base blood gas interpretation will provide answers as to the underlying pathophysiology of most emergency and critical care patients, most of the time. However, as the underlying chemistry behind acid–base balance in the body is extremely complex and, as yet, incompletely elucidated, a different technique may be needed in some critically ill animals. These will often give greater insight into the metabolic disturbances taking place and (most importantly) be utilized to alter clinical therapies to benefit the patient. All current methods of acid–base blood gas interpretation assess the  $[H^+]$  (pH) and respiratory ( $PCO_2$ ) components in a similar fashion – according to the 'standard' approach.

More advanced techniques for interpreting acid–base balance revolve around the 'strong ion' approach, developed (sequentially) by Singer & Hastings, Stewart and Constable. The simplified Stewart approach considers six potential reasons for acidosis or alkalosis (Figure 1).



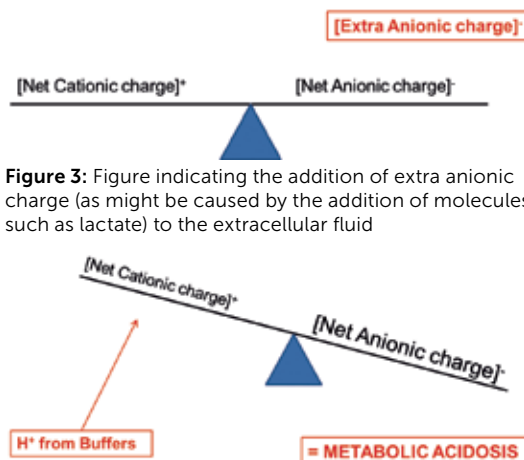
**Figure 1:** Independent variables influencing acid–base balance according to the simplified Stewart approach. SID is Strong Ion Difference,  $PCO_2$  refers to the partial pressure of carbon dioxide and  $A_{tot}$  corresponds to the level of non-volatile weak buffers (weak acids/bases) in the extracellular fluid

A further development of this is to consider influencers of acid–base in terms of their effect on electrochemical balance – normally the net positive (cationic) charge matches the net negative (anionic) charge (Figure 2). If a change to this equilibrium is initiated, buffering mechanisms try to restore balance, usually involving the movement of hydrogen ions to and from buffer molecules (and occasionally into and out of cells).



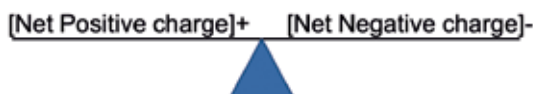
**Figure 2:** Figure indicates the normal electrostatic balance present in the extracellular fluid

So if an acid–base disturbance takes place (Figure 3), the balance is upset and  $H^+$  are mobilized to reset the net ECF charge (Figure 4), therefore, restoring the balance (Figure 5).



**Figure 3:** Figure indicating the addition of extra anionic charge (as might be caused by the addition of molecules such as lactate) to the extracellular fluid

**Figure 4:** Figure indicates the consequence of the imbalance induced by the addition of extra anionic charge to the extracellular fluid and the resultant increase in level of hydrogen ions, re-establishing electrostatic balance (Figure 5, below), but creating a metabolic acidosis



**Figure 5:** Indicates the return to electrostatic balance within the extracellular fluid

Therefore, it is possible to see how alterations in the major players in the extracellular fluid (ECF) will impact upon the  $[H^+]$  and therefore acid–base balance. An increase in ECF/plasma concentrations of any of the positively charged ions ( $Na^+$ ,  $K^+$ ,  $Ca^{++}$ ,  $Mg^{++}$ ) will cause a drive to push more  $H^+$  ions onto buffer molecules (or into cells). This therefore will make the ECF/plasma a less acidic environment: a metabolic alkalosis. This same effect would be caused by a decrease in the level of negatively charged ECF molecules, such as albumin,  $Cl^-$  or phosphate.

The converse of this is also true – decreased ECF cations results in a metabolic acidosis, as does increased ECF anions (such as lactic or ketoacids). It is possible to further develop this technique to permit a semi-quantitative assessment of the relative contributions of the various molecules concerned.

## ARTERIAL BLOOD GAS ANALYSIS

The main purpose of this is to assess the functioning of the respiratory system. To this end, two equations are useful:

$$A-a \text{ gradient} = [(P_{\text{barometric}} - P_{H_2O}) \times 0.21 - PaCO_2 / \text{Respiratory quotient}] - PaO_2$$

although in most circumstances this can be summarized as:

$$A-a \text{ gradient} = [149 - 1.25 \times PaCO_2] - PaO_2$$

with a normal result being <15 mmHg.

# Critical care

The major advantage of this is that ventilation is accounted for, although this equation is only valid when breathing room air.

A more generally applicable way of assessing pulmonary gas exchange (the health of the lungs) irrespective of the percentage of oxygen being breathed is:

$$\text{PF ratio (Carrico index)} = \text{PaO}_2/\text{FiO}_2$$

with values >450 indicating normal gas exchange, <380 indicating pulmonary compromise and <285 indicating severe pulmonary dysfunction.

## KEY LEARNING OBJECTIVES

- To understand the six mechanisms for acid–base disturbances according to the simplified Stewart approach
- To understand the concept of electrochemical balance in acid–base interpretation and the key players involved
- To understand the utility of the A-a gradient and the Carrico index in assessing pulmonary function

## MULTIPLE CHOICE QUESTIONS

1. According to the Stewart model, how can acidifying processes can be summarized?

- (A) Increased SID, increased  $\text{PCO}_2$  and reduced  $A_{\text{tot}}$
- (B) Reduced SID, increased  $\text{PCO}_2$  and reduced  $A_{\text{tot}}$
- (C) Increased SID, increased  $\text{PCO}_2$  and increased  $A_{\text{tot}}$
- (D) Reduced SID, increased  $\text{PCO}_2$  and increased  $A_{\text{tot}}$

2. For a dog, which of the following sets of results indicate significant pulmonary disease?

- (A)  $\text{FiO}_2$  0.21,  $\text{PaCO}_2$  45 mmHg,  $\text{PaO}_2$  79 mmHg
- (B)  $\text{FiO}_2$  0.4,  $\text{PaCO}_2$  24 mmHg,  $\text{PaO}_2$  113 mmHg
- (C)  $\text{FiO}_2$  0.4,  $\text{PaCO}_2$  45 mmHg,  $\text{PaO}_2$  144 mmHg
- (D)  $\text{FiO}_2$  0.21,  $\text{PaCO}_2$  24 mmHg,  $\text{PaO}_2$  107 mmHg

3. What are some of the major components assessed in quantitative base excess analysis?

- (A) Sodium, chloride, globulins, ketoacids
- (B) Sodium, chloride, albumin, ketoacids
- (C) Sodium, chloride, albumin, lactate
- (D) Sodium, chloride, albumin, creatinine

# Techniques for oxygen therapy

Dan Lewis

The purpose of normal, physiological ventilation is to deliver enough fresh gas to the alveoli to enable the carriage of oxygen to, and carbon dioxide from, the tissues. Ultimately, if tissue oxygen demand is not satisfied by oxygen supply, cellular hypoxia will ensue, with deleterious and potentially life-threatening results – reduced cell energy levels, ischaemia and cell death. In the presence of low blood oxygen levels, hypoxaemia, increased cardiac and respiratory work will try to compensate, but these mechanisms will eventually become exhausted.

The causes of hypoxaemia can be broadly divided into four main pathophysiological mechanisms:

- Hypoventilation
- Ventilation–perfusion mismatch
- Shunt
- Diffusion impairment

Several different disease processes lead to these. Obviously, an inadequate supply of oxygen (due to altitude, anaesthetic errors, etc.) or a reduced oxygen-carrying capacity (anaemia, impaired haemoglobin binding, etc.) will also impact upon blood oxygen content.

Many of the above processes can be ameliorated by the provision of oxygen supplementation to our

dyspnoeic patients; indeed, there are few occasions when this is not of benefit! This lecture will explore some of the different techniques that can be used to increase the amount of oxygen our patients receive, involving specialized equipment but also ‘DIY’ solutions achievable in all practices. Some advice will also be given as to what to do when these techniques appear inadequate. Finally, some mention will be made of new, ‘high-flow’ techniques, their applicability to companion animals, and their potential advantages for our most severely affected patients.

## KEY LEARNING OBJECTIVES

- To understand when oxygen supplementation may be beneficial to patients
- To appreciate a variety of different techniques and when to best employ them
- To recognize the downsides to oxygen supplementation

## MULTIPLE CHOICE QUESTIONS

1. When should supplemental oxygen should be humidified?

- (A) Always
- (B) Only if part of the airway is bypassed
- (C) Only at high gas flow rates
- (D) Never

2. How is inadequate ventilation most often defined?

- (A)  $\text{PaCO}_2 > 60 \text{ mmHg}$
- (B)  $\text{ETCO}_2 < 20 \text{ mmHg}$
- (C)  $\text{PaO}_2 < 80 \text{ mmHg}$
- (D)  $\text{PvO}_2 > 40 \text{ mmHg}$

3. Nasal oxygen supplementation at 100 ml/kg/min should increase inspired oxygen levels to which of the following?

- (A) 30%      (C) 37%
- (B) 21%      (D) 58%

## Nutrition in critical care

Isuru Gajanayake

### METABOLISM DURING CRITICAL ILLNESS

Starvation that is not associated with illness (e.g. when food is scarce) is highlighted by two key features, including a reduction in the basal metabolic rate and the preferential utilization of the body's fat stores for energy. In contrast, during illness there is preferential catabolism of lean body tissue (i.e. muscle) and an increase in the body's energy requirements. These metabolic derangements (termed stressed starvation) are driven by inflammatory mediators and other factors associated with illness. The consequences of these derangements can include hyperglycaemia, insulin resistance and increased carbon dioxide production, with subsequent effects on myocardial, respiratory and immune function.

### NUTRITIONAL REQUIREMENTS DURING CRITICAL ILLNESS

Despite the body's increased energy needs during critical illness, a relatively conservative energy provision is usually recommended because an overzealous energy provision can lead to metabolic complications. The current recommendation is to provide the resting energy requirement (RER) to critically ill dogs and cats. This can be calculated by the formula:

$$\text{RER in kilocalories per day} = 70 \times (\text{bodyweight in kg})^{0.75}$$

Use of illness multipliers (e.g.  $1.8\text{--}2 \times \text{RER}$  for sepsis) is no longer recommended.

In addition to the amount of energy provided to critically ill patients, the source of energy (i.e. relative proportions of the three energy-providing macronutrients) is also important. Fat provides more energy per gram than carbohydrate and protein. For this reason, high-fat diets can be useful to maximize energy consumption when food intake is reduced. Carbohydrate is also an essential source of readily available energy for critically ill patients. However, in patients with pre-existing hyperglycaemia, some care must be taken not to exacerbate this with high-carbohydrate diets. Protein is essential both as a source of energy and amino acids, and to minimize the muscle wasting associated with critical illness. High-protein diets may, however, be poorly tolerated in certain medical conditions (e.g. azotaemia). Finally, it is vital that

all diets fed to critically ill patients are balanced for their micronutrient needs (i.e. vitamins and minerals).

### PRACTICAL NUTRITION FOR CRITICAL ILLNESS

Prior to instituting a nutritional intervention (e.g. feeding tube, parenteral feeding), it is vital that fluid, electrolyte and acid-base deficits are restored. This is not only important to reduce some of the risks associated with feeding, but correction of these abnormalities may also improve the appetite in some patients.

Most critically ill veterinary patients are managed with enteral feeding, however parenteral nutrition is becoming more available. Enteral feeding usually necessitates placement of a feeding tube. Attempts at force-feeding are counterproductive and use of appetite stimulants (e.g. mirtazapine) is not ideal in critically ill patients. Naso-oesophageal feeding tubes are useful for short-term feeding of critically ill patients, especially if they are not good candidates for anaesthesia or surgery. Oesophagostomy tubes are a more robust option for short- to medium-term feeding and this method also allows use of a larger range of diets. Parenteral feeding techniques are usually used when enteral feeding is not tolerated, however this form of nutrition requires close monitoring.

### KEY LEARNING OBJECTIVES

- To comprehend the nutritional metabolic changes associated with illness
- To assess a critically ill patient's calorie and nutrient needs
- To appreciate the pros and cons of various nutritional interventions

### MULTIPLE CHOICE QUESTIONS

1. Which of these is feature of metabolism during critical illness?
  - (A) Increased muscle catabolism
  - (B) Increased fat catabolism
  - (C) Hypoglycaemia due to insulin resistance
  - (D) Reduced basal metabolic rate
2. Which of the following should be the energy provision for a critically ill patient?
  - (A) Illness energy requirement
  - (B) Maintenance energy requirement
  - (C) Resting energy requirement
  - (D) Exercise energy requirement

# Critical care

3. Which of the following is correct for oesophagostomy feeding tubes?
- (A) They must be placed under general anaesthesia

- (B) They require endoscopy to place  
(C) They should be avoided in pancreatitis  
(D) They are not appropriate for home-feeding

## Approach to diabetic ketoacidosis

Sophie Keyte

### DIAGNOSIS

- Diabetic ketoacidosis (DKA) – glucosuria, hyperglycaemia, ketonuria/ketonaemia and *metabolic acidosis* (pH < 7.3)

### CLINICAL PATHOLOGY AND DIAGNOSTIC TESTING

- Urinalysis
- Emergency database:
  - Blood glucose (BG)
  - Acid–base status – metabolic acidosis with increased anion gap (ketone accumulation)
  - Serum sodium concentration – most hyponatraemic (urinary sodium loss from osmotic diuresis)
  - Serum potassium concentration – usually normal to low
  - Serum urea and creatinine – often increased due to prerenal +/- renal factors. Interpret with urine specific gravity (USG)
- Additional investigations: significant concurrent infectious, inflammatory or hormonal diseases such as pancreatitis common
  - Haematology – usually stress leucogram; look for evidence of concurrent disease
  - Liver enzymes, total bilirubin – increases common
  - Canine pancreatic lipase immunoreactivity (cPLI)/trypsin-like immunoreactivity (TLI) – consider abdominal ultrasonography
  - Phosphate – usually normal to low pretreatment. Can fall dangerously low during treatment
  - Magnesium deficiency is also common
  - Diagnostic imaging – survey thoracic/abdominal radiography to screen for concurrent disease; +/- abdominal ultrasound. Not usually done until appropriate treatment has been initiated

### TREATMENT OF THE ILL DKA ANIMAL

Aims:

- Restore water and electrolyte balance
- Provide adequate insulin to 'switch off' ketone production (*neutral* insulin)

- Correct acidosis
- Identify any underlying disease
- Provide a carbohydrate substrate when required by the insulin treatment

Abnormal parameters should be returned *slowly* towards normal (over 36–48 hours); rapid changes can be harmful and potentially dangerous (e.g. causing cerebral oedema).

### Fluid therapy

- Crystalloids (e.g. Hartmann's or lactated ringers) usually adequate (can consider 0.9% normal saline)
- Aim to rehydrate over 24 hours and allow for ongoing losses (generally a rate of at least 4ml/kg/hr is appropriate initially)
- Rapid administration rarely needed unless patient is in shock (give as intermittent 10–20ml/kg boluses over 15–20 minutes – assess after each one)

### Electrolyte supplementation

- Potassium – body depletion often severe even if serum potassium concentration within normal limits and starting insulin therapy shifts potassium into cells; therefore, *all cases should receive potassium supplementation ideally before starting insulin therapy*. Do not exceed 0.5 mmol/kg/h.
- Phosphate – hypophosphataemia precipitated by insulin treatment, regular monitoring recommended.
- Magnesium – monitoring; especially if non-responsive hypokalaemia.

### Insulin therapy

- Essential
- Regular crystalline insulin (neutral insulin)
- Continuous rate I/V infusion (Intermittent IM technique an alternative)
- Aim for gradual decline in BG concentration, until glucose is 10–15 mmol/l. Increase/decrease hourly dose as required. Begin glucose infusion at BG concentration noted above to hold BG within this range and thus allow continued insulin administration
- When animal is well hydrated, eating, drinking, not vomiting or ketoacidotic, change to an intermediate-acting insulin as for an uncomplicated DM patient

### Supportive therapy

- Pancreatitis common

## Patient monitoring

- BG measurement every 1–2 hours initially; adjust insulin therapy and begin glucose infusion when 10–15 mmol/l
- Hydration status every 2–4 hours; adjust fluids accordingly
- Serum electrolyte and acid/base every 6–12 hours; adjust fluids accordingly
- Urine output, glycosuria, ketonuria; adjust fluid therapy accordingly
  - Ketonuria may initially appear worse on dipstick as beta-hydroxybutyrate (not measured) is converted into acetone and acetoacetate (measured)
- Body weight, packed cell volume/total protein (PCV/TP), temperature and blood pressure daily

## KEY LEARNING OBJECTIVES

- Outline the pathophysiology and diagnosis of diabetic ketoacidosis (DKA) in dogs and cats
- Outline the management and treatment of the clinical spectrum of DKA patients
- Outline the complications associated with DKA including electrolyte changes and likely prognosis

## MULTIPLE CHOICE QUESTIONS

1. What biochemical findings are present in diabetic ketoacidosis?
  - (A) Glucosuria, hyperglycaemia and ketonuria/ketonaemia
  - (B) Glucosuria, hyperglycaemia, ketonuria/ketonaemia and metabolic acidosis
  - (C) Persistent fasting glucosuria and hyperglycaemia
  - (D) Ketonuria/ketonaemia
2. If you encounter a non-responsive hypokalaemia in your DKA patient, what electrolyte could be implicated?
  - (A) Sodium
  - (B) Phosphorus
  - (C) Chloride
  - (D) Magnesium
3. What is the predominant hormone involved in development of DKA?
  - (A) Glucagon
  - (B) Growth hormone
  - (C) Cortisol
  - (D) Ghrelin

# Emergency management of urethral obstruction

**JD Foster**

Acute urethral obstruction (UO) can quickly result in life-threatening complications, including hyperkalaemia, azotaemia and uroabdomen. Prompt diagnosis and emergency stabilization are needed to provide optimal patient safety and the best chance for survival. Numerous factors may affect the success of urinary decompression and the risk for reblockage.

## RECOGNIZING THE PATIENT WITH URETHRAL OBSTRUCTION

Although clients observing a male cat make several unproductive attempts to urinate may quickly lead to the suspicion for UO, cats may be presented for other problems. Cats with UO may be lethargic, tachypnoeic with open-mouth dyspnoea, or even laterally recumbent and poorly responsive. Upon triage examination, abdominal palpation often reveals a large, tense, unexpressible urinary bladder. However, the absence of a urinary bladder should raise the concern for bladder rupture and uroabdomen. Laboratory analysis typically reveals azotaemia, hyperkalaemia and a metabolic acidosis. The constellation of these findings should also prompt the clinician to consider UO if it weren't previously a differential diagnosis.

## INITIAL PATIENT STABILIZATION

While the most important step in managing the patient with UO is relieving the obstruction, many patients are too cardiovascularly unstable to undergo such a procedure. Hyperkalaemia may produce bradycardia, atrial standstill and cardiac arrest, and should be addressed prior to unblocking the patient. The most effective therapy in correcting hyperkalaemia is to restore urine output, however therapies such as intravenous dextrose with regular insulin and beta-agonist (terbutaline or albuterol) therapy may help improve hyperkalaemia by moving potassium from serum to the intracellular space. This process may take 20 minutes or more to occur, therefore additional therapy may be needed. Intravenous calcium gluconate, while having no effect on hyperkalaemia, alters the threshold potential for cardiac myocytes and can almost immediately resolve the bradycardia and bring a return of normal sinus rhythm. This is often helpful to improve the cardiovascular stability of the patient while waiting for potassium-lowering medications to take effect.

## DECOMPRESSING URINARY OBSTRUCTION

Sedation is typically required for urethral unblocking; however a severely unstable patient may only require local anaesthesia. Obstruction may be caused by mucus plugs, crystalline grit, uroliths and other intraluminal objects, which may require several different types of urethral catheters for effective unblocking. Several sizes, configurations (open vs. closed) and types of catheter materials (polyurethane vs. hydrophilic, etc.) should be available. Local anaesthesia may be very beneficial in improving success and the speed of unblocking.

# Critical care

## PREVENTING REOBSTRUCTION

After urethral catheterization, the next focus is preventing the patient from developing further UO. Studies have shown that medical therapies, choice of catheter size and duration of catheterization may all affect the rate of reblocking. Decreasing patient stress, alleviating urethrosperm, increasing urine output and correcting any underlying cause are all important considerations and may have important consequences on UO recurrence. Surgical interventions, such as urethrostomy, may be considered for patients with recurrent UO that cannot be prevented with medical management. However, risk of ascending infection and proper client education should be considered in such cases.

## KEY LEARNING OBJECTIVES

- Know how to quickly recognize urethral obstruction (UO) and stabilize the patient for unblocking
- Review the various techniques that may allow for fast and successful urethral catheterization
- Recognize the treatments that could help decrease the rate of UO recurrence as well as their limitations

## MULTIPLE CHOICE QUESTIONS

1. A male cat with a urethral obstruction has a heart rate of 50 beats per minute. What is the most appropriate initial therapy to help stabilize this patient?  
(A) Calcium gluconate  
(B) Sodium bicarbonate  
(C) Regular insulin and dextrose  
(D) Terbutaline
2. What medication has been shown to reduce the risk of recurrent UO?  
(A) Phenylpropanolamine  
(B) Glucagon  
(C) Phenoxybenzamine  
(D) Prazosin
3. Which of the following therapies is not necessary for managing UO in a 2-year-old male cat?  
(A) Antibiotics  
(B) Feeding a canned food diet  
(C) Analgesia  
(D) Anxiolytics

# Acute kidney injury

JD Foster

The term acute renal failure has been replaced with *acute kidney injury* (AKI) in both human and veterinary medicine. Focusing on kidney injuries helps identify earlier opportunities for patient intervention compared to waiting for the late stage of kidney dysfunction when the development of azotaemia occurs. Thorough diagnostic evaluation and treatment of the underlying cause of AKI may lead to recovery of kidney function, which is not encountered with chronic kidney disease.

Acute kidney injury is a clinical syndrome of varying severity that can be initiated by a multitude of aetiologies. It is characterized by a rapid decline in glomerular filtration rate (GFR) and renal function, however many forms are reversible (at least partially). AKI can be divided into three clinical categories based on the underlying aetiology:

- Prerenal AKI: characterized by renal hypoperfusion, however the renal parenchyma is not damaged
- Intrinsic renal AKI: damage occurs to the renal parenchyma, usually caused by ischaemia or a nephrotoxin
- Postrenal or obstructive AKI: acute obstruction of the urinary tract

## PRERENAL ACUTE KIDNEY INJURY

Also called haemodynamic AKI, prerenal AKI is a decreased GFR due to diminished renal perfusion, with no pathological changes to the renal parenchyma. The hallmark of prerenal AKI is the rapid correction of GFR with

restoration of renal perfusion. Prerenal AKI can result from a variety of conditions, including hypovolaemia, decreased cardiac output, systemic vasodilation, or intrarenal vasoconstriction. Drugs that impair the maintenance of effective circulating volume, including systemic vascular resistance or renin-angiotensin-aldosterone system activity, may contribute to decreased hypoperfusion. Such classes of drugs include non-steroidal anti-inflammatory drugs, diuretics and angiotensin-converting enzyme inhibitors, amongst others.

## INTRINSIC ACUTE KIDNEY INJURY

Damage to the renal parenchyma may occur due to: disease of the large renal vessels, disease of the renal microvasculature and glomeruli, ischaemic and nephrotoxic acute tubular necrosis, and other tubulointerstitial disease. Infectious and toxic injuries are quite common in veterinary patients. Persistent prerenal and postrenal reductions in GFR can result in intrinsic renal pathology and AKI.

## POSTRENAL ACUTE KIDNEY INJURY

Obstruction of the renal pelvis, ureter, urinary bladder or urethra leads to postrenal AKI. Such conditions result in increased hydrostatic pressure within the lumen of the urinary tract upstream from the obstruction due to the continued production of urine by the kidney(s). Persistent obstruction increases intratubular pressure in Bowman's capsule causing a dramatic fall in GFR, however unilateral nephroureteral obstruction will not result in isosthenuria or azotaemia due to the preserved function of the contralateral kidney. Increased intratubular pressure will impair tubular function and subsequent sodium reabsorption,



potassium excretion and urine-concentrating capabilities. A back leak of tubular contents through tight junctions of renal epithelial cells may occur, causing further ischaemia and inflammation.

## MANAGEMENT OF ACUTE KIDNEY INJURY

Meticulous patient care is needed to provide opportunity for renal recovery and to prevent iatrogenic nephron injury. Although challenging, medical therapy should reverse the derangements occurring with renal dysfunction, particularly electrolyte and acid–base disturbances, dysvolaemia, anorexia and uraemia. Proper therapy may stop ongoing renal injury and provide support to allow time for renal recovery.

## KEY LEARNING OBJECTIVES

- Understand how acute kidney injury (AKI) can be identified prior to the development of azotaemia
- Review the diagnostic evaluation of the AKI patient in order to determine the aetiology
- Recognize when veterinary intervention may cause further renal injury

## MULTIPLE CHOICE QUESTIONS

1. All of the following medications may cause prerenal AKI *except* which one?
  - (A) Diuretics
  - (B) Angiotensin-converting enzyme inhibitors
  - (C) Antioxidants
  - (D) Non-steroidal anti-inflammatory drugs
2. How would a cat with postrenal AKI caused by a ureterolith be best managed?
  - (A) Surgical intervention to allow for urine to bypass the obstruction (ureteral stent or bypass)
  - (B) Aggressive intravenous fluid therapy to cause diuresis
  - (C) Dietary dissolution of the ureterolith
  - (D) Non-steroidal anti-inflammatory drug to reduce ureteral inflammation
3. Why should intravenous fluids be administered to the patient with intrinsic AKI?
  - (A) To increase GFR
  - (B) To maintain renal perfusion
  - (C) To achieve maximal urine output
  - (D) To flush intratubular debris and obstruction

# Management of canine acute pancreatitis

Isuru Gajanayake

## CLINICAL PRESENTATION

Pancreatitis is a very heterogeneous disease in dogs, however most dogs display signs of nausea, dehydration and abdominal pain, and thus require hospitalization for supportive care. Some dogs can develop life-threatening complications, such as disseminated intravascular coagulation (DIC) and systemic inflammatory response syndrome (SIRS). Gastrointestinal ileus and jaundice are more common, but less concerning. Chronic sequelae of pancreatitis include abscessation and pseudocysts.

## DIAGNOSIS

It is imperative that diagnostic testing for pancreatitis is only performed in dogs with appropriate clinical signs, because false diagnoses are common. For this reason, both blood testing and diagnostic imaging are usually needed to confirm pancreatitis. Serological testing for acute pancreatitis necessitates measurement of lipase of pancreatic origin, but even this analyte can be elevated in diseases other than pancreatitis.

Diagnostic imaging is also essential for confirmation of pancreatitis. Imaging is usually performed using ultrasonography, with the identification of a hypoechoic pancreas surrounded by hyperechoic fat being consistent

with pancreatitis. Abdominal computed tomography is also very useful for the diagnosis of pancreatitis, particularly in large or obese dogs.

## MEDICAL MANAGEMENT

Medical management is the cornerstone of canine acute pancreatitis management. Firstly, this entails correction of fluid, electrolyte and acid–base imbalances with appropriate crystalloid fluid therapy. Correction of hypokalaemia, in particular, can help improve the clinical picture in some dogs. Antiemetic therapy is also vital in this disease, even if vomiting is not a feature, because the inappetence associated with pancreatitis is usually due to nausea. Maropitant is a safe and very effective medication for this purpose, however occasionally other medications such as ondansetron are needed.

Finally, analgesia is vital in canine acute pancreatitis. This is most effectively provided using opioids, such as buprenorphine or methadone. Use of multimodal analgesia infusions (e.g. methadone +/- lidocaine +/- ketamine) can optimize analgesia and reduce the adverse effects associated with each component. Non-opioid options for analgesia include paracetamol and non-steroidal anti-inflammatory medications, however these should be used with some caution. Other medications used in canine pancreatitis include gut protectants and antibiotics. Antacids and prokinetics are usually only indicated when there is regurgitation of gastric contents due to ileus.

## NUTRITIONAL MANAGEMENT

Nutrition plays an integral role in the management of dogs with acute pancreatitis. This is usually achieved by enteral (tube) feeding; however post-pyloric feeding

# Critical care

(i.e. using a jejunostomy tube) is not necessary. Enteral feeding is most effectively provided by an oesophagostomy feeding tube. Naso-oesophageal tubes can also be used for short-term enteral nutrition. Appetite stimulants are not recommended. Parenteral nutrition is not readily available to the general practitioner, however this method can be very useful to provide nutrition when enteral methods are not tolerated.

The nutrient profile of diets fed to dogs with acute pancreatitis is also important. The calorie provision should be calculated to meet the dog's resting energy requirement, whilst the macronutrient (i.e. protein, fat and carbohydrate) provision is usually tailored to meet each dog's specific needs.

## KEY LEARNING OBJECTIVES

- To use clinical, serological and imaging information to correctly diagnose pancreatitis
- To understand the pros and cons of various medications used for pancreatitis
- To formulate a feeding plan for dogs with acute pancreatitis

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is the best test for canine acute pancreatitis?  
(A) Amylase  
(B) Pancreatic lipase  
(C) Trypsin-like immunoreactivity  
(D) Faecal proteinase inhibitor
2. Which of the following is a potent centrally acting antiemetic?  
(A) Metoclopramide  
(B) Ondansetron  
(C) Maropitant  
(D) Omeprazole
3. Feeding to manage acute pancreatitis is best achieved by which of the following?  
(A) Naso-oesophageal feeding tube  
(B) Parenteral nutrition  
(C) Oesophagostomy feeding tube  
(D) Mirtazapine medical therapy



## Section VI

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# Open To All Streams

Sunday 7 April

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Sunday 7 April  
Hall 1

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# My pragmatic approach to...

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- 392 09:00–09:45  
**PU/PD**  
Sophie Keyte
- 393 09:55–10:40  
**Hypercalcaemia**  
Sophie Keyte
- 394 11:15–12:00  
**Juvenile lameness**  
Duncan Barnes
- 395 12:10–12:55  
**Seizures**  
Jeremy Rose
- 395 14:15–15:00  
**Prescription foods**  
Isuru Gajanayake
- 396 15:10–15:55  
**Pruritic skin disease**  
Laura Buckley
- 399 16:05–16:55  
**Chronic diarrhoea**  
Eilidh Gunn

# My pragmatic approach to...

## PU/PD

**Sophie Keyte**

Polyuria (PU) is defined as urine output >50 ml/kg/24h. Normal dogs and cats drink 20–90 ml/kg/24h depending on diet moisture content. Polydipsia (PD) is defined as a fluid intake >90–100 ml/kg/24h in dogs and >45 ml/kg/24h in cats.

Water balance in the body is controlled primarily by water intake (thirst – controlled by osmolality) and water loss (primarily renal – controlled by anti-diuretic hormone (ADH)). Causes of PU/PD can be divided into disorders causing primary polyuria and those causing primary polydipsia.

### INVESTIGATION

#### Step 1

This will give you the diagnosis in the majority of cases.

- History:
  - Including reproductive history (recent season?), diet/environmental changes, drugs/toxins
  - Quantify PD if possible; ensure genuinely PU rather than just incontinence (though PU may lead to incontinence in some dogs)
- Physical examination:
  - Evidence of renal or liver disease, or endocrinopathies?
  - Lymphadenopathy (lymphoma is most common cause of hypercalcaemia) or any neoplasia (e.g. anal gland mass – anal gland carcinomas are another common cause of hypercalcaemia)?
  - Vaginal discharge?
- Haematology, complete biochemistry (including electrolytes and bile acid stimulation), and urinalysis (including culture):
  - Evidence of renal or liver disease, hypercalcaemia, diabetes mellitus, hyponatraemia, hypokalaemia?
  - Stress leucogram, increased liver enzymes, urinary tract infection (UTI) without pyuria – consider hyperadrenocorticism (HAC), perform specific testing
  - Hyperkalaemia, hyponatraemia, lack of stress leucogram in sick dog – consider hypoadrenocorticism, perform specific testing
  - Hospital water diary and urine specific gravity (USG) can be helpful: USG <1.006 excludes generalized renal dysfunction; lack or inhibition of ADH or psychogenic polydipsia more likely; USG >1.020 makes DI unlikely; USG 1.008–1.029 with proteinuria increases suspicion of chronic kidney disease or HAC
  - Serum T4 (cats)

#### Step 2

- Consider abdominal imaging (renal disease, pyelonephritis, pyometra)
- Consider specific endocrine testing for hyper-/hypoadrenocorticism:

- Adrenocorticotrophic hormone (ACTH) stimulation test to rule out hypoadrenocorticism; only approximately 60–80% sensitive for HAC
- Low-dose dexamethasone suppression test (LDDST) or urine cortisol:creatinine (UCCR); highly sensitive for HAC but poor specificity. Useful in this situation as you are trying to exclude it – normal LDDST or UCCR makes HAC very unlikely

#### Step 3

If ALL the above are unhelpful:

- Consider HAC again (most commonly!), early chronic kidney disease, or occult pyelonephritis. Further assessment of renal function, if appropriate, may include creatinine or iothelol clearance tests, renal biopsy, or trial treatment for pyelonephritis
- Remaining differentials are central diabetes insipidus (DI), primary nephrogenic DI or psychogenic polydipsia – consider water deprivation test (WDT) or treatment trial with desmopressin (DDAVP, an ADH analogue) to differentiate between these. However, this is NOT WITHOUT RISK. Both of these approaches require careful monitoring. WDT is very labour intensive, and usually requires bladder catheterization
- It is essential to rule out above diseases first before performing a water deprivation test
- As a general rule, don't do this test without speaking to a specialist first; for further details, refer to endocrinology textbooks

### KEY LEARNING OBJECTIVES

- Understand the pathophysiology leading to polyuria/polydipsia (PU/PD)
- Apply a logical approach to listing causes of PU/PD
- Outline an appropriate diagnostic approach to PU/PD

### MULTIPLE CHOICE QUESTIONS

1. Along with a hypertonic renal medulla what is the other main factor affecting urine concentration at the collecting tubules?
  - (A) Plasma urea concentration
  - (B) Medullary glucose concentration
  - (C) ADH concentration
  - (D) Renal cortisol concentration
2. Primary polydipsia can occur as a result of which disease process?
  - (A) Chronic kidney disease
  - (B) Urinary tract infection
  - (C) Pyometra
  - (D) Malabsorptive gastrointestinal disease
3. What urine specific gravity achieved in a clinical case makes true PU/PD very unlikely?
  - (A) 1.040      (C) 1.010
  - (B) 1.008      (D) 1.004

# Hypercalcaemia

Sophie Keyte

## PATHOPHYSIOLOGY

The concentration of serum ionized calcium (physiologically 'active' calcium) is kept within narrow limits by the action of parathyroid hormone (PTH) on bone resorption, renal calcium excretion and metabolism of vitamin D. PTH is secreted from the parathyroid glands and is controlled by serum calcium concentration. Hypercalcaemia is an important differential diagnosis for polyuria/polydipsia (PU/PD).

## DIFFERENTIAL DIAGNOSIS OF HYPERCALCAEMIA (HARD IONS)

- Hyperparathyroidism (primary, common; secondary nutritional, uncommon)
  - Addison's (hypoadrenocorticism, common) – up to 33% of Addison's cases are hypercalcaemic
  - Renal disease – 10–20% of chronic kidney disease (CKD) have hypercalcaemia, but usually have lowered ionized calcium; also seen in acute disease
  - D – hypervitaminosis D (uncommon), can be secondary to cholecalciferol rodenticides, vitamin D skin preparations (treatment for psoriasis) or granulomatous disease
  - Idiopathic – an important cause in cats
  - Osteolytic (uncommon)
  - Neoplasia (hypercalcaemia of malignancy, lymphoma, anal gland adenocarcinoma, multiple myeloma, carcinomas of various organs, melanoma) – the most common cause of hypercalcaemia, usually due to production of a PTH-related peptide (PTH-rP)
  - Spurious – laboratory error
- Most common are lymphoma (dogs), idiopathic (cats).

## INVESTIGATION OF HYPERCALCAEMIA

1. History and physical examination – including lymph nodes and anal glands
2. Haematology/biochemistry (see Figure 1) – confirm serum hypercalcaemia. Consider serum albumin concentrations (low albumin results in falsely low calcium) and phosphorus ( $\text{Ca} \times \text{P} > 5$  results in

increased risk of soft tissue calcification). Check ionized calcium if available

3. Look for lymphoma/other neoplasia – fine-needle aspiration of lymph nodes; survey radiographs; scan liver/spleen; bone marrow aspiration?
4. If no evidence of neoplasia:
  - (A) Suspicious of hypoadrenocorticism? – adrenocorticotrophic hormone (ACTH) stimulation test
  - (B) To further investigate primary hyperparathyroidism or occult neoplasia – PTH  $\pm$  PTH-rP, special sampling requirements (frozen EDTA samples), contact laboratory directly
  - (C) Suspicious of primary hyperparathyroidism? – Ultrasonography of neck, any evidence of enlarged parathyroid glands (may be palpable in cats)? Exploratory cervical surgery?
  - (D) Consider measurement of vitamin D metabolites (contact laboratory)

## KEY LEARNING OBJECTIVES

- Outline the pathophysiology of hypercalcaemia
- Outline the differential diagnoses for hypercalcaemia in dogs and cats
- Outline a logical approach to the hypercalcaemic patient

## MULTIPLE CHOICE QUESTIONS

1. What is the predominant hormone in control of body calcium concentrations?
  - (A) Parathyroid hormone
  - (B) Calcitonin
  - (C) Growth hormone
  - (D) Cortisol
2. What is the most common cause of hypercalcaemia in dogs?
  - (A) Vitamin D toxicity
  - (B) Hypoadrenocorticism
  - (C) Chronic kidney disease
  - (D) Lymphoma
3. When measuring calcium concentrations, which electrolyte should be measured concurrently to help in refining differential diagnoses?
  - (A) Potassium
  - (B) Sodium
  - (C) Phosphate
  - (D) Magnesium

	Serum Ca	Ionized Ca	PO <sub>4</sub>	Urea*	PTH	PTHrP
Hypercalcaemia of malignancy	↑	↑	↓	Normal or ↑	↓	↑
Primary hyperparathyroidism	↑	↑	Low N or ↓	Normal or ↑	↑	↓
Chronic kidney disease	↑ 10–20% cases	Normal or ↓	↑	↑	↑	
Hypoadrenocorticism	↑	Normal	Variable	↑	Normal	
Hypervitaminosis D	↑	↑	↑	Normal or ↑	Normal	

**Figure 1:** Biochemical abnormalities in hypercalcaemia.

\*Urea can be elevated with hypercalcaemia of any cause due to dehydration and, in severe prolonged cases, due to renal tubular damage – it is sometimes difficult to know whether azotaemia is the cause or effect of hypercalcaemia. Ionized calcium may be useful to differentiate these

## Juvenile lameness

**Duncan Barnes**

Lameness is a common presenting complaint in juvenile animals. Many cases are due to minor knocks and strains and will resolve with a brief period of rest and analgesics. However, some causes of juvenile lameness can have long-term consequences if they are not treated promptly. Such conditions include:

- Physeal fractures, that can lead to premature or asymmetric closure of the growth plates, resulting in angular limb deformity or joint incongruity
- Septic arthritis in juveniles, which can cause rapid irreversible destruction of the articular cartilage
- Medial patellar luxation, which can cause the trochlear groove to develop abnormally along with permanent changes to the shape of the femur and tibia

Many developmental disorders can lead to chronic arthritis including:

- Hip dysplasia
- Elbow dysplasia
- Osteochondritis dissecans

For some of these conditions, there are treatment options available at an early age which are relatively straightforward and allow the avoidance of more complex procedures later in life. For example, the simple procedure of juvenile pubic symphysiodesis for a dog with hip dysplasia can allow the avoidance of the need for a total hip replacement as an adult. In other cases, early diagnosis can allow a change in management, to reduce the impact of the disease on the patient. It is, therefore, important to take a pragmatic approach to help identify which cases need further investigation, and how urgently this should occur. When investigating juvenile lameness, a systematic approach can help to avoid missing rare causes of lameness, however, it is good to remain pragmatic and remember that common things are common. The desire to avoid missing significant problems must be balanced against the risks of repeated anaesthetics, the loss of client confidence due to perceived overinvestigation, and the financial impracticality of fully investigating every episode of juvenile lameness.

Central to any investigation of juvenile lameness is a good clinical history, gait evaluation and clinical examination. This will usually allow the source of the lameness to be narrowed down to one or more regions of one or more limbs and/or the axial skeleton. Armed with this information the clinician can then decide whether further investigation is necessary, when it should be performed,

and what further diagnostic tests are needed. Further diagnostics could include examination under sedation or anaesthesia, radiography, ultrasonography, advanced imaging and arthrocentesis.

Using an interactive case-based presentation, the following common scenarios will be studied.

- The traumatized juvenile patient:
  - Long bone fracture
  - Physeal fracture
  - Avulsion fracture
- Persistent juvenile lameness:
  - Congenital malformation
  - Hip dysplasia
  - Elbow dysplasia
- Multifocal juvenile lameness:
  - Panosteitis
  - Metaphyseal osteopathy
  - Septic arthritis

### KEY LEARNING OBJECTIVES

- Know the common causes of juvenile lameness
- Identify clinical situations in which further investigation of lameness is indicated and how urgently this should be performed
- Understand the long-term consequences of some causes of juvenile lameness

### MULTIPLE CHOICE QUESTIONS

1. Which of these clinical situations needs to be investigated further?
  - (A) Crepitus and severe pain on elbow manipulation
  - (B) Pyrexia with swelling and pain of multiple joints
  - (C) Non-weightbearing lameness with abnormal angulation of the femur
  - (D) All of the above
2. Which of the following is a common developmental cause of juvenile lameness?
  - (A) Fragmented medial coronoid process
  - (B) Tibial tuberosity avulsion
  - (C) Lumbosacral disease
  - (D) Cranial cruciate ligament rupture
3. Which of the following is NOT a potential consequence of physeal fracture?
  - (A) Angular limb deformity
  - (B) Metaphyseal osteopathy
  - (C) Limb shortening
  - (D) Elbow incongruity

# Seizures

## Jeremy Rose

Seizures are a common neurological complaint in small animal practice. Managing seizures can be challenging. This is because seizures have a wide spectrum of clinical signs, a range of different causes and varying consequences to the pets and their owners. Adopting a practical and systematic approach to epileptic seizures allows better management of even the most difficult cases. The systematic approach revolves around three major steps:

1. Confirming the episode is a seizure
2. Trying to identify the cause of seizure
3. Offering treatment of the seizure

Confirming an episode is a seizure can be challenging and the key to starting management of these cases. We need to differentiate seizures from other paroxysmal episodes such as syncope, narcolepsy/cataplexy, obsessive-compulsive disorders, movement disorders, idiopathic head tremors, vestibular disease and generalized neuromuscular diseases. Given the paroxysmal episodes are rarely seen by the practitioner, this needs to be done by taking a thorough history and performing a general and neurological examination. If classifying the paroxysmal episode is particularly challenging, videoing the problem can be useful but the owner's history is key. Identifying a pre-ictal, ictal and post-ictal phase is unique to seizures and localizes your patient to the forebrain.

Identifying the cause of the seizures allows you to provide a prognosis and select an appropriate treatment for your seizing patient. The causes of seizures can be divided into reactive or epileptic categories. Reactive causes are either metabolic or toxic in nature, whilst epileptic seizures are structural or idiopathic. Making a differential list and then performing further investigations will allow you to identify the cause of seizures. Ruling out reactive seizures is important for all seizing cases and should include a haematology, starved biochemistry, and liver function test. Once this has been done, determining the causes of epileptic seizures often requires advanced imaging and this may not be possible for some owners or practices. Where epileptic seizures are present your history and neurological examination will allow you to order your differential list. This can help you determine the likelihood of finding something on further investigations that would alter your therapy of the case. Where a case with an

initially normal neurological examination does not go for further investigations, repeated examinations over time can be helpful to try and rule out progressive diseases which may warrant further investigations or therapy.

When and how to treat seizures will be based on your presumptive diagnosis and a host of factors related to your patient's history and various owner considerations. It is important to balance your patient's risks of morbidity and mortality with adhering to the cascade, costs and side effects of treatment to try and optimize quality of life. Where an anti-seizure drug is used you should provide information on the side effects of the medication alongside the aim of treatment, the need for routine monitoring, the efficacy of drugs and situations that may warrant alterations of medications. Education of owners is key to helping them cope with having a seizing patient and helping you manage your cases effectively.

## KEY LEARNING OBJECTIVES

- Analyse a patient to decide if it is having epileptic seizures
- Utilize the neurological examination to help form a differential list
- Decide when to start treatment for seizing patients

## MULTIPLE CHOICE QUESTIONS

1. Which paroxysmal episodes can be interrupted?
  - (A) Idiopathic head tremors
  - (B) Seizures
  - (C) Syncope
  - (D) Vestibular disease
2. What is reported to be the most common reactive cause of seizure on serum biochemistry in dogs?
  - (A) Hypercalcaemia
  - (B) Hyperkalaemia
  - (C) Hypokalaemia
  - (D) Hypoglycaemia
3. What is the only UK licensed drug for treating structural epilepsy in dogs?
  - (A) Imepitoin
  - (B) Levetiracetam
  - (C) Phenobarbital
  - (D) Potassium bromide

# Prescription foods

## Isuru Gajanayake

### REASONS TO USE PRESCRIPTION FOODS

Prescription diets are generally used for three reasons:

- To treat or cure a disease
- To improve the clinical signs and outcome
- To prevent recurrence of a disease.

Apart from a few examples (e.g. food allergies and obesity), it is uncommon for dietary therapy to cure a disease. In most cases, prescription diets are used to improve clinical signs (e.g. hydrolysed diets in inflammatory bowel disease), improve longevity (e.g. renal formulated diets for chronic kidney disease) and to prevent recurrence of disease (e.g. for urolithiasis).

It is important that the veterinary surgeon (veterinarian) prescribing these diets has an understanding of the specific nutrient modulation(s) in these diets and how these help to manage and/or prevent certain diseases. It is also important to appreciate the relative evidence

# My pragmatic approach to...

base behind the recommendations for prescription diets. For example, strong evidence supports the use of protein- and phosphorus-restricted renal diets to both improve clinical signs and prolong life in canine and feline chronic kidney disease. Recommendations for other prescription diets may be based on weaker evidence, such as physiological principles and extrapolation from studies in other species. It is imperative that any dietary therapy in a patient is based on strong evidence so that unnecessary and sometimes expensive dietary modifications are not recommended. Where the evidence is sparse, the client must be counselled about this so that an appropriate nutrition plan can be implemented.

## RISKS OF PRESCRIPTION FOODS

As with any medical or surgical procedure, dietary interventions are not without risks. Protein-restricted diets (e.g. renal or hepatic formulated) can cause detrimental effects in susceptible groups (e.g. growing animals). Similarly, markedly sodium-restricted diets designed for cardiac disease can potentially worsen signs if used inappropriately. Sodium- and fat-restricted diets can negatively influence the palatability of the food and thus reduce consumption.

## ALTERNATIVES TO PRESCRIPTION FOODS

Alternatives to prescription diets include generic commercial diets and home-cooked diets. Examples of the former category includes, use of 'light' diets for obesity and use of single-source protein diets for food-responsive skin or gut disease. Some caution should be exercised when using these diets because the nutrient profiles and/or ingredient lists may not be as desired to manage these conditions. In some diseases, a key nutrient used in the dietary modulation can be provided as a solitary supplement (e.g. omega-3 fish oils).

Although home-cooked diets can be formulated to be nutritionally balanced and to provide a desired nutrient profile, these diets can be expensive and time consuming to produce. Feeding of unbalanced home-cooked diets during illness (e.g. chronic kidney disease) can lead to detrimental consequences. Formulation of a balanced home-cooked diet requires the services of a veterinary nutritionist and a micronutrient supplement(s) to ensure

the diet is balanced. Home-cooked diets can, however, play a role in dogs and cats with multiple medical conditions, where a suitable prescription diet is not available.

## KEY LEARNING OBJECTIVES

- To understand the rationale and evidence behind prescription diets
- To be aware of the possible adverse effects of prescription diets
- To appreciate the advantages and limitations of the alternatives to prescription diets

## MULTIPLE CHOICE QUESTIONS

1. What are the most important nutrient modulations in renal formulated diets?  
(A) Protein restriction and sodium restriction  
(B) Phosphorus restriction and potassium supplementation  
(C) Protein restriction and phosphorus restriction  
(D) Phosphorus restriction and fish oil supplementation
2. What is the main risk of feeding renal diets to growing animals?  
(A) Cataracts due to amino acid deficiency  
(B) Orthopaedic disease due to phosphorus restriction  
(C) Pancreatitis due to the high fat content  
(D) Hepatic encephalopathy due to protein content
3. Which of the following is true about home-cooked diets?  
(A) Are a cheap and easy alternative to prescription foods  
(B) Require formulation by a veterinary nutritionist  
(C) Can be balanced without using micronutrient supplements  
(D) Have been shown to be superior to prescription foods

# Pruritic skin disease

## Laura Buckley

The investigation and management of pruritic skin disease is a lot like cooking; if you start with the right ingredients and follow the recipe, you are likely to end up with something that resembles the suspected outcome. However, if you get the basics wrong and either miss out or add extra stages into the method, then the outcome is a lot less predictable. Diagnostic investigations are very important in confirming the diagnosis but unless they have been selected and interpreted in the light of an

accurate history and appropriate clinical signs, they can be misleading. For example, a dog with sarcoptic mange may be negative on skin scrapings but show positive reactions to house dust mites on allergy testing, similarly a dog with pemphigus foliaceus will be negative on skin sampling and treatment trials for ectoparasites and will not respond to an elimination diet; however, neither of these animals will present with a history and skin lesions typical of atopic dermatitis.

## INGREDIENTS

- Pruritus; many skin lesions look like they should be pruritic, but it is easy to omit this essential ingredient, particularly in cats



- Key historical features (Figure 1)
- Typical lesion character (Figure 1)
- Typical distribution of skin lesions (Figure 1)
- +/- Favrot's diagnostic criteria; developed for the clinical diagnosis of atopic dermatitis in dogs and feline non-flea hypersensitivity dermatitis in cats

## PREPARATION

Use key historical features and character and distribution of skin lesions to formulate a rational, prioritized differential diagnosis list (Figure 1).

## METHOD

1. Select diagnostic tests based on your differential diagnosis list (Figure 1)
2. Avoid uncritical use of comprehensive 'dermatology panels' as they may include unnecessary tests that may be misinterpreted and/or lead to unnecessary treatment; testing should be driven by your differential diagnoses
3. Perform 6–8-week parasite treatment trial (patient, in-contact animals and environment) to rule out sarcoptic mange and flea bite hypersensitivity even if skin sampling is negative

4. Do not perform serological IgE/IgG food allergen tests; they have no utility in confirming or ruling out food-induced atopic dermatitis; at best they may indicate suitable for foods for a food trial. They should never replace a proper appropriate elimination diet
5. Do not perform serological IgE or intradermal testing for environmental allergens to confirm a diagnosis of environmental allergen-induced atopic dermatitis; they are used as a guide for allergen specific immunotherapy only
6. Make a diagnosis

## SERVING SUGGESTIONS

Make a treatment plan based on your diagnosis. For atopic dermatitis make an initial plan by selecting treatments from each of the following groups:

- Allergen avoidance and allergen specific immunotherapy (not possible for animals with atopic-like dermatitis)
- Anti-inflammatories/immunomodulators
- Skin barrier care
- Avoidance of flare factors (e.g. parasitic infestation or microbial infection).

Disease	History	Lesion character	Lesion distribution	Diagnostic investigation
<b>Parasitic</b>				
Sarcoptic mange	Intense pruritus, any age, more common in young	Crusted, erythematous papules, scale, lichenification, alopecia	Pinnal margins, elbows, hocks, ventrum	Skin scrapes, treatment trial
Otoacariasis ( <i>Otodectes cynotis</i> )	Any age, more common in young	Brown/black ceruminous discharge, erythema	Ear canals, can have ectopic disease	Observe mites, indirect impression smear
Neotrombiculosis	Late summer–autumn, contact with woods/fields	Diffuse/papular erythema, crusted papules	Feet, ventrum, pinnae	Observe larvae, treatment trial
Cheyletiellosis	Any age, more common in young	Scale, erythema, miliary dermatitis in cats, alopecia	Dorsum	Coat brushings, acetate tape test, superficial skin scrape
Demodicosis ■ <i>Demodex canis</i> , <i>D. injai</i> ■ <i>D. cornei</i> , <i>D. gatoi</i>	Young/middle aged–senior animals, may be concurrent internal disease	Alopecia, erythema, +/- signs consistent with bacterial folliculitis	Variable	Skin scrapes, trichography, (biopsy)
Pediculosis	Debilitation/lethargy, overcrowding/poor sanitation	Matted hair, erythematous papules, miliary dermatitis in cats	Any, may accumulate at ears and body openings	Acetate tape test Coat brushings
Endoparasite dermatosis ■ <i>Pelodera</i> ■ Hookworms	Poor housing and sanitation	Erythematous papules, lichenification, footpad hyperkeratosis	Sites in contact with ground	Skin scrapes ( <i>Pelodera</i> ), faecal floatation

# My pragmatic approach to...

Microbial infections				
Bacterial pyoderma (rarely a primary disease)	Any age, breed or sex, often secondary to HD	Papules, pustules, erythema, epidermal collarettes ± alopecia	Depends on primary cause, often ventrum when HD	Direct impression smear cytology
<i>Malassezia</i> dermatitis	As above, seen with internal disease in cats	Erythema, lichenification, brown sebaceous discharge	Skin folds, interdigital skin, inguinum, axillae, ears, ventral neck	Acetate tape cytology
Dermatophytosis (rarely pruritic)	Any age, more common in young	Alopecia (often annular), scale, erythema, (rarely pustules)	Any	Trichography, fungal culture
Hypersensitivity				
Flea bite hypersensitivity	Any age, breed or sex	Diffuse/papular erythema, miliary dermatitis in cats, scale, alopecia	Caudal dorsum/pelvic limbs, inguinum	Coat brushings, wet paper test, flea treatment trial
Food-induced atopic dermatitis <sup>a</sup>	6 months–3 years, relapsing pruritus and skin lesions	Diffuse to papular erythema, lichenification, feline reaction patterns*	Face, feet, ears, flexor elbows, ventrum	Favrot's criteria, rule out differentials, elimination diet
Environmental allergen-induced atopic dermatitis <sup>a</sup>	As above but may be seasonal	As above	As above	As above
Allergic contact dermatitis	Contact with suspect allergen	Macular/papular erythema	Sparsely haired skin in contact with allergen	Avoidance and provocative exposure
Other				
Pemphigus foliaceus	Any age, more common middle age to senior, Akita, Chow	Large pustules and crusts ± alopecia	Face, pinnae, footpads, may be generalized	Direct impression smear cytology, biopsy
Epitheliotropic lymphoma	Older animals	Erythematous patches/plaques/nodules, scaling, depigmentation, erosions, ulcers, footpad hyperkeratosis	Localized or generalized ± mucosa, footpads	Biopsy

**Figure 1:** Summary of typical history, lesion character (excluding pruritus and self-trauma) and distribution and essential diagnostic tests for pruritic skin diseases

<sup>a</sup>See Favrot's criteria for clinical diagnosis of atopic dermatitis in dogs and feline non-flea hypersensitivity dermatitis in cats. HD, hypersensitivity dermatitis

## KEY LEARNING OBJECTIVES

- Evaluate patient history and clinical signs to create differential diagnosis lists
- Use differential diagnosis lists to lead the investigation of pruritic skin disease
- Accurately interpret diagnostic tests to make a definitive diagnosis and initial treatment plan

## MULTIPLE CHOICE QUESTIONS

- Which of the following is a typical lesion seen in canine atopic dermatitis?
  - Pustule
  - Diffuse erythema

- Epidermal collarette
  - Erythematous plaque
- Which of the following lesion distributions is most commonly seen in canine sarcoptic mange?
    - Face, pinnae, footpads
    - Skin folds, interdigital skin, axillae
    - Feet, ventrum, pinnae
    - Pinnae, hocks, ventrum
  - Which of the following is a diagnostic test required in the investigation of atopic dermatitis?
    - Elimination diet trial
    - Food allergen IgE/IgG serology
    - Skin biopsy and histopathology
    - Intradermal allergy testing

# Chronic diarrhoea

## Eilidh Gunn

The investigation and management of chronic diarrhoea can be a frustrating process for owners and veterinary surgeons alike, however by adopting a logical and common-sense approach, the majority of cases can usually be rewarding to treat. It is often helpful to remember a basic differential list for chronic diarrhoea:

- 'Gastrointestinal' causes:
  - Inflammatory (e.g. dietary hypersensitivity, inflammatory bowel disease, antibiotic-responsive diarrhoea syndrome)
  - Infectious (e.g. *Giardia*, *Tritrichomonas* in cats)
  - Neoplastic (e.g. lymphoma)
- 'Extra-gastrointestinal' causes:
  - Pancreatic (e.g. exocrine pancreatic insufficiency/pancreatitis)
  - Renal disease/liver disease
  - Endocrine disease (e.g. hypoadrenocorticism)

Using a careful history and physical examination, many of these differentials can be refined. For example: diarrhoea in the poorly, polyuric polydipsic patient may prompt the clinician to consider extra-gastrointestinal causes first and perform a biochemistry panel and basal cortisol early on. Weight loss should alert the clinician to consider a malabsorptive process and check albumin, trypsin-like immunoreactivity (TLI), folate and cobalamin concentrations while the presence of vomiting and abdominal pain may prompt the measurement of pancreatic lipase immunoreactivity (PLI).

Where chronic diarrhoea is the only presenting problem and the dog is otherwise well then ruling out infectious differentials is a sensible beginning. Whilst faecal cultures are usually performed routinely in such cases, their interpretation can be somewhat of a challenge. Often a dialogue with your commercial laboratory can help clarify the significance of a particular isolate. Whilst faecal flotation examinations are relatively cheap diagnostic tools at least three samples (pooled) are recommended to screen for *Giardia* and it can sometimes be easier all round to perform a quick fenbendazole trial (50 mg/kg orally q24h for 5 days) instead.

The next logical step is to consider a diet trial. It is usually useful to educate clients on the intended strategies behind a highly digestible diet, novel protein diet or hydrolysed diet to ensure compliance and avoid frustration down the line. The author usually adopts a hydrolysed diet in most cases for a 3–4-week trial with telephone follow-up 1–2 weeks in to ensure things are not deteriorating in the interim.

Should diet fail to incite sufficient improvement then further diagnostics (as outlined above) are indicated. Assuming these initial investigations are normal/negative and the animal is still 'well' with a stable weight and

normal albumin concentration, then it is reasonable to consider empirical therapy with an antibiotic, e.g. oral metronidazole (10–15 mg/kg q12h).

Beyond this, biopsies are often considered. Prior to considering the best approach for performing biopsies, the author prefers to perform abdominal ultrasonography to ensure that there are no obvious focal areas of pathology (e.g. loss of layering within the jejunum) that would dictate exploratory laparotomy over endoscopic biopsy.

Should biopsies not be an option for any reason (finances, morbidity...) then a corticosteroid trial is reasonable provided the adverse effects and limitations of this as a 'trial treatment' are fully explained to the client from the outset. The author usually prefers an initial 'anti-inflammatory' dose of 1 mg/kg/day that can be titrated up or down as required (although usually not beyond 2 mg/kg/day in dogs and 3–4 mg/kg/day in cats).

## KEY LEARNING OBJECTIVES

- Use key history and physical examination findings to dictate the order and urgency of routine diagnostics
- Spending the time communicating diagnostic/therapeutic strategies with clients from the outset can avoid frustration further down the line
- The timing and type of intestinal biopsy should be dictated by the patient's overall clinical status, previous diagnostics and presumed distribution of gastrointestinal pathology

## MULTIPLE CHOICE QUESTIONS

1. Which of the following is NOT a differential diagnosis for chronic diarrhoea?
  - (A) Hypoadrenocorticism
  - (B) Exocrine pancreatic insufficiency
  - (C) Hypothyroidism
  - (D) Giardiasis
2. What is the most appropriate initial diagnostic strategy for a dog with chronic diarrhoea, weight loss and polydipsia?
  - (A) Faecal flotation test
  - (B) Biochemistry
  - (C) Abdominal ultrasonography
  - (D) Upper gastrointestinal endoscopy
3. In which of the following circumstances would you consider performing biopsies (endoscopic or surgical as appropriate) before performing a diet trial?
  - (A) Marked weight loss
  - (B) Hypoalbuminaemia
  - (C) Identifiable structural changes within the gastrointestinal tract on ultrasonography
  - (D) All of the above



Sunday 7 April  
Hall 5

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# Orthopaedics

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- 402 08:45–09:30  
**Forelimb lameness in cats: sources and solutions**  
Karen Perry
- 403 10:05–10:55  
**Hindlimb lameness in cats: sources and solutions**  
Karen Perry
- 404 11:00–11:45  
**Feline osteoarthritis: diagnosis and management**  
Karen Perry
- 405 13:05–13:50  
**Coronoid disease in dogs: where are we now?**  
Laura Cuddy
- 406 14:00–14:45  
**Humeral intracondylar fissures in dogs**  
Laura Cuddy
- 407 14:55–15:40  
**Ununited anconeal process: what to do?**  
Laura Cuddy
- 408 15:50–16:35  
**Elbow incongruence: what to do when**  
Laura Cuddy

## Forelimb lameness in cats: sources and solutions

Karen Perry

### INTRODUCTION

- Non-traumatic conditions affecting the feline elbow include degenerative joint disease (DJD) and medial humeral epicondylitis (MHE)
- Non-traumatic shoulder conditions in the cat are rarely encountered but include glenoid dysplasia, bicipital tenosynovitis, accessory centres of ossification and osteochondritis dissecans of the humeral head
- Carpal conditions in cats are generally traumatic with hyperextension injuries and medial collateral ligament injuries being the most commonly reported

Elbow DJD and MHE and glenoid dysplasia will be concentrated on in this talk.

### ELBOW DEGENERATIVE JOINT DISEASE

Elbow DJD is common in domestic cats but the aetiology remains controversial. Cats with unilateral lameness associated with elbow DJD may have a noticeable lameness. However many cats are bilaterally affected making the lameness less obvious. Thickening of the elbows and/or joint effusion may be palpable and the range of motion of the elbow may be reduced.

Osteophyte formation is a key radiographic feature. Soft tissue mineralization and intra-articular mineralized bodies may also be evident.

Treatment depends on the severity of the associated clinical signs. Most cats can be managed non-surgically. For cases with osteochondral intra-articular fragments, arthroscopy or arthrotomy can be performed to remove these. In cases with marked disability which does not respond to either medical management or more conservative surgical management, salvage options may be considered.

### MEDIAL HUMERAL EPICONDYLITIS

MHE is caused by avulsion and calcification of the antebrachial flexor tendons at their insertion site on the medial humeral epicondyle. The cause of MHE is essentially unknown but may be related to trauma or overuse. MHE cases tend to have a mild–moderate lameness and they may be reluctant to jump down from heights. In cases where MHE is causing a clinical problem, a pain response can often be elicited by palpation over the flexor muscles and medial epicondyle.

In the early stages, MHE may be overlooked as there will be no radiographic signs. In mild cases radiographic signs are relatively subtle with rounding and slight irregularity of the medial humeral condyle; in advanced cases,

large semicircular mineralized structures may be seen at the caudomedial aspect of the joint.

Mild cases of MHE can be treated non-surgically. In cases where this is ineffective, treatment consists of surgical removal of the calcified tendon and muscle tissue.

### DYSPLASIA OF THE SHOULDER JOINT

Dysplasia of the shoulder joint is a congenital condition. The altered joint conformation can lead to instability or subluxation of the glenohumeral joint and subsequent DJD. The lameness in cases with shoulder joint dysplasia can vary in intensity from mild to severe. As this condition has been reported in conjunction with other conditions, the clinical presentation can vary widely.

Radiography reveals incongruity; the glenoid cavity is normally short and shallow with a thickened subchondral bone plate. The humeral head may also be slightly displaced.

Treatment options include non-surgical management with physical rehabilitation, weight reduction and analgesic therapy. In cases where this is not effective, the only surgical option available is arthrodesis of the shoulder joint.

### KEY LEARNING OBJECTIVES

- Distinguish between common causes of forelimb lameness in cats based on presenting signs and findings on orthopaedic examination
- Identify appropriate diagnostic tests to enable a definitive diagnosis to be achieved in cases of feline forelimb lameness
- Differentiate between cases where non-surgical management is appropriate and those where surgical treatment should be pursued

### MULTIPLE CHOICE QUESTIONS

1. Which of the following statements regarding elbow DJD in cats is CORRECT?
  - (A) Most cases occur secondary to medial coronoid process disease
  - (B) The most severe disease affects the medial compartment of the joint
  - (C) The key radiographic feature is soft tissue mineralization
  - (D) Surgical management is necessary in order to regain satisfactory function in the majority of cats
2. Which of the following statements regarding MHE in cats is CORRECT?
  - (A) The ulnar head of the flexor carpi ulnaris muscle is most frequently affected
  - (B) The condition is always clinically significant and should be treated
  - (C) In the early stages, mild new bone formation will be noted over the medial humeral condyle

- (D) If non-surgical management has not resulted in improvement within 4 weeks, surgical treatment should be seriously considered
3. Which of the following statements regarding shoulder joint dysplasia in cats is CORRECT?
- (A) Cats with shoulder joint dysplasia are predisposed to luxation of the glenohumeral joint

- (B) As the condition is congenital, cats normally present very young at 6–12 months of age
- (C) Radiography normally reveals an altered shape to the humeral head with a normal glenoid cavity
- (D) Most cases require shoulder arthrodesis in the medium-to-longer term to maintain comfort

# Hindlimb lameness in cats: sources and solutions

Karen Perry

## THE HIP JOINT

Degenerative joint disease (DJD) of the hips secondary to hip dysplasia (HD) is relatively common in the domestic cat. Clinical signs include inactivity, hindlimb lameness, difficulty climbing and walking in a crouched position. Lameness varies from mild to severe. Physical examination findings include pain and crepitus upon hip extension and abduction and muscle atrophy.

The most common radiographic finding is a shallow acetabulum. Radiographic degenerative changes seem to develop later and are less marked than in the dog.

Non-surgical management may include:

- Environmental and activity modulation
- Physical rehabilitation
- Dietary modulation
- Weight reduction
- Nutraceuticals
- Drug therapy:
  - Non-steroidal anti-inflammatory drugs (NSAIDs)
  - Multimodal analgesia

In cases where non-surgical management does not relieve discomfort there are two recommended options for surgical management: femoral head and neck excision and total hip replacement.

## THE STIFLE JOINT

### Cranial cruciate ligament rupture

Cranial cruciate ligament (CrCL) rupture is not as common in cats as in dogs but it may be under-reported. Whether CrCL rupture in cats is largely traumatic or whether some cats suffer degenerative rupture is a matter of some debate. The history is generally of an acute-onset marked lameness. Diagnosis is generally straightforward based

on clinical signs including lameness, stifle pain, cranial tibial thrust and laxity in cranial drawer.

Radiographs typically show joint effusion. Cranial displacement of the tibia may be apparent and in degenerative or chronic cases, degenerative changes may be evident.

Non-surgical management consists of a short course of NSAIDs, exercise restriction and weight loss. Recovery is protracted following non-surgical management with limb-loading taking many months to return to near normal. Cats may return to normal function more quickly after surgical stabilization. While numerous surgical procedures have been described to stabilize CrCL-deficient stifles in cats, extracapsular procedures are generally favoured. Prognosis for return to normal function after CrCL rupture is good to excellent.

### Patellar luxation

Patellar luxation (PL) is less common in cats than in dogs, however, the incidence may be underestimated. PL is more commonly medial than lateral. As in dogs, the most common abnormalities seen are a shallow trochlear groove and medial displacement of the tibial tuberosity.

Most cats presenting for developmental PL are relatively young. Diagnosis differs to that in dogs in that clinically normal cats have some degree of laxity of the stifle joint with subluxation of the patella being considered a normal finding. In a compliant cat, PL can be detected with the patient either standing or in lateral recumbency. Luxation is generally easiest to achieve with the stifle in extension and the tibia internally rotated.

Radiographs typically show mild changes only. The position of the patella on the radiograph will depend on the grade of luxation and cannot be relied upon for diagnosis.

Treatment is only recommended in high-grade cases or in low-grade cases with associated clinical signs. Surgical repair provides more favourable results when compared to non-surgical management. Surgical techniques include femoral trochlear sulcoplasty, tibial tuberosity transposition, soft tissue balancing and partial parasagittal patellectomy with a combination of techniques being employed in a single stifle as required. The outcome following surgery is excellent in the majority of cases.

## KEY LEARNING OBJECTIVES

- Distinguish between common causes of hindlimb lameness in cats based on presenting signs and findings on orthopaedic examination
- Summarize salient differences between cats and dogs in the aetiopathogenesis and diagnosis of common causes of hindlimb lameness
- Discuss the advantages and disadvantages of different forms of surgical management for treatment of common causes of hindlimb lameness in cats

## MULTIPLE CHOICE QUESTIONS

1. Which of the following statements regarding radiographic assessment of cats with hip dysplasia and associated DJD is CORRECT?
  - (A) The most common finding is subluxation of the hips
  - (B) Degenerative changes develop later in cats and to a less severe extent than in dogs
  - (C) The most extensive remodelling normally involves the femoral neck
  - (D) Less than 50% coverage of the femoral head is indicative of hip dysplasia

2. Which of the following statements regarding cranial cruciate ligament rupture in cats is CORRECT?
  - (A) Concurrent meniscal damage is common
  - (B) Concurrent lateral meniscal damage is more common than concurrent medial meniscal damage
  - (C) Partial cranial cruciate ligament tears occur commonly in cats
  - (D) Cranial cruciate ligament rupture in cats is almost always degenerative
3. Which of the following statements regarding patellar luxation in cats is CORRECT?
  - (A) Radiographs of cats with patellar luxation normally show severe degenerative changes
  - (B) If clinical signs are associated with the condition, non-surgical management should be trialed before proceeding to surgery
  - (C) In surgical treatment a partial parasagittal patellectomy may be required to allow the patella to seat within the trochlear groove
  - (D) If the distal fascial attachment remains intact, a tension-band wire is not required following a tibial tuberosity transposition

## Feline osteoarthritis: diagnosis and management

**Karen Perry**

### INTRODUCTION

Degenerative joint disease (DJD) has a high prevalence in domestic cats, affecting both the appendicular and axial skeleton, and can be associated with pain. The hip, stifle, tarsus and elbow are all frequently affected. While most feline cases of DJD appear to be primary, secondary DJD is also recognized, most commonly following trauma and hip dysplasia.

### HISTORY AND ORTHOPAEDIC EXAMINATION

Due to the chronicity and gradual onset of the pain associated with DJD, the accompanying behavioural changes can be subtle. Alterations in jumping, becoming less graceful, changes in toileting, sleeping or resting more, playing less, grooming less and overgrowth of nails have all been reported secondary to DJD.

With DJD, pain is most frequently found on extremes of joint motion but this can be difficult to assess in cats.

The presence of crepitus, joint thickening and joint effusion has also been shown to be predictive of the presence of radiographic DJD, as has a decreased range of motion in the shoulder, elbow, carpus and tarsus.

### RADIOGRAPHY

The sensitivity of radiographs for detection of DJD in cats is unknown but orthogonal views of joints likely to be affected, based on physical examination findings, should be obtained. If radiographic signs consistent with DJD are not seen, DJD should not be ruled out. It appears that cats do not form as much radiographic pathology as other species, so the absence of obvious radiographic signs does not preclude the presence of DJD that may be associated with pain.

The radiographic appearance of feline DJD often differs from that seen in the dog. Osteophytosis is generally less evident in cats than in other species and soft tissue thickening and joint effusion also appear to be less apparent. Additionally, it is not unusual to see ossicles and soft tissue mineralization within feline joints affected by DJD.

### TREATMENT OF DEGENERATIVE JOINT DISEASE

Whilst less is known about feline DJD than about this condition in other species and the changes associated with it are less obvious, there is little doubt that cats



suffer pain associated with DJD and that this warrants appropriate therapy. A multimodal management plan comprising environmental and activity modulation, physical rehabilitation, dietary modulation, weight reduction and drug therapy where required should be instigated in the first instance and appropriate monitoring adopted to ensure success. Non-steroidal anti-inflammatory drugs (NSAIDs) are the mainstay of drug therapy for DJD in other species and there is a lot of evidence to support their effectiveness in cats. Multimodal analgesic therapy is now being introduced to the feline patient, although experience in this is relatively lacking at this stage. While there are many medications which can be used, most of these are off-licence. Amantadine, gabapentin and tramadol are the ones most commonly added in to the treatment plan when NSAID therapy alone proves ineffective.

Where clinical signs cannot be controlled using this plan, surgical options are available including joint replacement, arthrodesis, excision arthroplasty, removal of intra-articular fragments and decompressive spinal surgery.

### KEY LEARNING OBJECTIVES

- Recognize the diverse range of clinical signs which can be associated with feline degenerative joint disease (DJD)
- Compare and contrast the radiographic signs of DJD between cats and dogs
- Construct a multimodal treatment plan for a cat suffering mobility impairment associated with DJD

### MULTIPLE CHOICE QUESTIONS

1. Which of the following statements is CORRECT regarding the radiographic appearance of feline DJD?
  - (A) Osteophytosis is more proliferative in cats than in dogs
  - (B) Soft tissue thickening and joint effusion are readily appreciable in the majority of cases
  - (C) Thinning of cartilage is often evident
  - (D) Soft tissue mineralization is frequently seen
2. Which of the following statements is CORRECT regarding the use of NSAIDs for cats with DJD?
  - (A) There is no evidence that NSAIDs are effective for treatment of DJD in cats
  - (B) Monitoring of blood pressure is recommended during NSAID use
  - (C) Meloxicam and robenacoxib are both licensed for long-term use
  - (D) Detection of abnormalities in kidney status is a complete contraindication to NSAID use
3. Which of the following statements regarding feline DJD is CORRECT?
  - (A) DJD has a low prevalence in domestic cats
  - (B) Most cases of DJD in cats appear to occur secondary to joint dysplasia
  - (C) There is a mismatch between clinical and radiographic signs of DJD in cats
  - (D) DJD can be completely ruled out on the basis of a radiographically normal joint

## Coronoid disease in dogs: where are we now?

**Laura Cuddy**

This lecture will review recent developments in the understanding, diagnosis and treatment of medial coronoid disease in dogs.

Medial coronoid disease is the most common cause of forelimb lameness in dogs. Lesions may be identified at the apex of the medial coronoid process or radial incisure of the ulna, and range from softened cartilage to fissuring or fragmentation of underlying subchondral bone. Although initially thought to be a manifestation of osteochondrosis, histopathological studies have identified microcrack formation consistent with supraphysiological loading. Microcracks propagate and coalesce, resulting in eventual fatigue failure of the subchondral bone. The exact cause of the overload, however, remains somewhat unclear. Purported causes include static or dynamic proximal radioulnar step incongruence, elliptical trochlear notch, rotational instability and musculo-tendinous mismatch.

Secondary osteoarthritic changes and subtrochlear sclerosis may be identified on plain radiographs. The gold standard for diagnosis of medial coronoid disease is a combination of computed tomography (CT) and arthroscopic examination. CT permits evaluation of subchondral bone surfaces and elbow congruency, but does not yield information on status of the overlying cartilage. Conversely, arthroscopy can assess surface cartilage, but cannot identify isolated underlying subchondral bone lesions.

Conservative management consists of weight management, non-convulsive exercise and medications to treat inflammation and pain. Intraarticular injections of corticosteroids, platelet-rich plasma or stem cells are becoming widely used.

Fragment removal and debridement of the medial coronoid process via arthroscopy is best performed early in the disease process, and appears superior to arthrotomy or conservative management. Subtotal coronoid osteotomy (SCO) may be performed to remove a larger portion of pathological cartilage and bone. Bi-oblique dynamic proximal ulnar osteotomy (BODPUO) may be considered if proximal radioulnar incongruence (short radius) is present.

Medial compartment disease refers to erosion of cartilage on both the ulnar and humeral sides of the joint. Canine unicompartamental elbow (CUE) arthroplasty system (Arthrex Vet Systems) is an option for cases with

medial compartment disease and secondary osteoarthritis. CUE involves resurfacing the diseased area of the medial portion of the humeral condyle and the medial coronoid process of the ulna with UHMWPE implants that are in contact during stance phase. Other options for medial compartment disease are techniques that redistribute the load from the medial to lateral elbow compartments, such as sliding humeral osteotomy (SHO), or proximal abducting ulnar osteotomy (PAUL). Total elbow replacement may be considered in cases with global end-stage osteoarthritis.

Overall, the effective treatment of medial coronoid disease remains complicated by our limited understanding of the exact aetiopathogenesis.

## KEY LEARNING OBJECTIVES

- Explain the proposed aetiopathogenesis of medial coronoid disease
- Outline the pros and cons of diagnostic modalities for medial coronoid disease
- Compare and contrast available treatment options for medial coronoid disease and medial compartment disease

## MULTIPLE CHOICE QUESTIONS

1. What is the purported aetiopathogenesis of medial coronoid disease?  
(A) Osteochondrosis  
(B) Incomplete ossification  
(C) Overload phenomenon  
(D) Acute trauma
2. What is the current gold standard for diagnosis of medial coronoid disease?  
(A) Plain radiographs  
(B) Computed tomography  
(C) Arthroscopy  
(D) Computed tomography and arthroscopy
3. What structures in the elbow joint are affected by medial compartment disease?  
(A) Humeral trochlea and medial coronoid process  
(B) Humeral capitulum and lateral coronoid process  
(C) Radial head and medial coronoid process  
(D) Humeral trochlea and capitulum

# Humeral intracondylar fissures in dogs

**Laura Cuddy**

The humeral condyle develops as two separate centres of ossification. Failure of the lateral and medial portions of the humeral condyle to fuse results in a persistent cartilaginous plate in the sagittal plane, and is referred to as incomplete ossification of the humeral condyle (IOHC). While it was traditionally believed that all fissures identified in the humeral condyle were due to IOHC, it has recently been postulated that stress fractures are to blame for the majority of cases identified in middle-aged to older dogs. Referring to these cases as IOHC would therefore be a misnomer, and the term humeral intracondylar fissure (HIF) is preferred.

Whilst some fissures may be identified on plain radiographs, identification may be complicated by obliquity and superimposition of the ulna. Computed tomography (CT) has become modality of choice for identification of intracondylar fissures.

The best course of treatment for HIF remains controversial. Many surgeons do not treat clinically silent HIF due to the risk of complications with intervention. A recent observational study found that when HIF is identified as an incidental finding, 18% progress to fracture. The goals of intervention in patients with pain and lameness referable to the elbow are to prevent future condylar fracture, resolve lameness and to promote fusion. A transcondylar screw is most commonly used to achieve these goals. Transcondylar screws may be placed in positional or lag fashion. Application from medial-to-lateral, although technically more challenging, is reported to have a significantly lower complication rate

than lateral-to-medial. Many surgeons now place these screws percutaneously, with or without fluoroscopic guidance, and using C-shaped aiming devices.

It is important that the largest feasible screw size is used; the screw is likely to undergo cyclic loading as the humeral condyle commonly fails to heal, leading to cyclic fatigue and screw breakage. As a guide, the screw should approximate 30–50% of the diameter of the mid-point of the humeral condyle. This typically translates to a 4.5-mm cortical or shaft screw in a spaniel size dog. Some surgeons prefer to use a 5.0-mm locking screw as it has a larger core diameter. In larger breeds, a 5.5-mm cortical screw may be appropriate.

Complications associated with transcondylar screw placement include seroma, infection, screw breakage and non-union. Screw breakage is often identified as recrudescence of lameness and may be difficult to identify, even on CT. The broken screw is removed and replaced with a larger size. When placing a transcondylar screw it is prudent to anticipate screw breakage may occur and to use a longer screw for future retrieval.

Some surgeons advocate a biological approach rather than a biomechanical approach to HIF; combining implants with grafting techniques may promote osseous fusion and relieve stress on implants. The primary concern with a biological approach in stress fractures is that the bone may re-fracture if the underlying stressor is not identified and addressed.

## KEY LEARNING OBJECTIVES

- Understand the aetiopathogenesis of humeral intracondylar fissures
- Recall useful diagnostic modalities for humeral intracondylar fissures
- Compare and contrast treatment options for humeral intracondylar fissures

## MULTIPLE CHOICE QUESTIONS

1. What is the proposed aetiopathogenesis of humeral intracondylar fissures in dogs?
  - (A) Stress fracture
  - (B) Traumatic injury
  - (C) Osteochondritis dissecans
  - (D) Retained cartilaginous core
2. If a humeral intracondylar fissure is identified as an incidental finding, what is the reported subsequent fracture rate?

- (A) 8%
- (B) 18%
- (C) 58%
- (D) 98%

3. What is the ideal size of transcondylar screw for stabilization of humeral intracondylar fissure?
  - (A) 10–15% midpoint humeral condyle
  - (B) 30–50% midpoint humeral condyle
  - (C) 60–80% midpoint humeral condyle
  - (D) 100% midpoint humeral condyle

# Ununited anconeal process: what to do?

**Laura Cuddy**

Ununited anconeal process (UAP) is an uncommon condition seen primarily in specific large- and giant-breed dogs, particularly German Shepherd Dogs. In breeds predisposed to UAP, the anconeal process is a distinct centre of ossification that should fuse with the ulna before 20 weeks. Therefore, a definitive diagnosis of UAP cannot be made prior to 20 weeks. It is believed that asynchronous growth of the radius and ulna (short ulna) results in abnormal pressure on the anconeal process during development. Male dogs are twice as likely to have UAP than females, and the condition is bilateral in 11–30% of affected dogs. Dogs with UAP typically demonstrate lameness between 5 and 9 months of age, or less commonly at an older age. UAP may also be an incidental radiographic finding in mature and middle-aged dogs with no lameness.

Diagnosis of UAP can be usually made on a flexed mediolateral radiograph of the elbow. Congruency of the proximal radioulnar joint should be assessed to see whether short ulna is present. Secondary degenerative changes of the elbow are often present. Other components of elbow dysplasia may be identified on computed tomographic or arthroscopic evaluation.

Treatment options for UAP include:

- UAP excision
- Bi-oblique dynamic proximal ulnar osteotomy (BODPUO)
- UAP stabilization (lag screw fixation)
- UAP stabilization in combination with BODPUO
- Distal segmental ulnar osteotomy (very young dog with short ulna)
- No treatment or conservative management (middle-aged to older dog with no clinical signs)

UAP excision may be performed via arthrotomy (caudolateral approach or modified Wendelburg medial approach). Arthroscopic-assisted removal can be performed, however, it is often challenging as the anconeal process is generally not mobile due to extensive fibrous

adhesions and is quite large. Seroma is a common post-operative complication. Many dogs obtain surprisingly good limb function following UAP excision, although the prognosis for working and athletic dogs remains guarded. UAP excision is preferred in older dogs with sudden-onset lameness due to dislodgement of UAP with elbow hyperextension.

Proximal ulnar osteotomy (PUO) is recommended to address elbow incongruence associated with UAP. In young dogs, the anconeal process should subsequently fuse to the ulna, albeit in a slightly abnormal position. BODPUO is performed in younger dogs; fixation of the PUO may be prudent in older dogs as persistent non-union of the ulnar osteotomy may ensue. Long-term functional results may be superior to UAP excision. Dynamic PUO may also be combined with UAP excision in older puppies with a very mobile anconeal process.

Fixation of the UAP with a lag screw alone has been described, but does not address underlying incongruency. Combining lag screw fixation with PUO has higher rates of radiographic fusion compared with lag screw fixation alone and is treatment of choice when UAP is identified early.

Regardless of the technique performed, progression of degenerative joint disease is inevitable. Prognosis is dependent on age at time of surgery, condition of anconeal process and degree of secondary change.

## KEY LEARNING OBJECTIVES

- Explain the aetiopathogenesis of ununited anconeal process
- Outline how to diagnose ununited anconeal process
- Describe treatment options for ununited anconeal process with reference to age and degree of secondary osteoarthritis

## MULTIPLE CHOICE QUESTIONS

1. After what age can a diagnosis of ununited anconeal process be made?
  - (A) At birth
  - (B) 12 weeks
  - (C) 20 weeks
  - (D) 1 year

2. Which radiographic view of the elbow is the most useful to diagnose ununited anconeal process?
- (A) Craniocaudal
  - (B) Craniolateral caudomedial oblique
  - (C) Extended mediolateral
  - (D) Flexed mediolateral

3. What is often the preferred treatment option for a middle-aged dog with an incidental finding of ununited anconeal process?
- (A) Bi-oblique proximal ulnar osteotomy
  - (B) Excision of the ununited anconeal process
  - (C) Lag screw fixation with proximal ulnar osteotomy
  - (D) No surgical treatment

## Elbow incongruence: what to do when

Laura Cuddy

The elbow joint is a complex and highly congruent joint that is composed of the humeroulnar, humeroradial and proximal radioulnar articulations. Although technically disparity between any of the surfaces of the three joints comprising the elbow joint may result in elbow incongruence, elbow incongruence traditionally refers to a step incongruence at the proximal radioulnar joint (radioulnar incongruence or RUI). Other potential forms of elbow incongruence include elliptical trochlear notch and dynamic radioulnar incongruence. Dynamic radioulnar incongruence (approximately 0.7 mm axial radioulnar translation) during the stance phase has been described as a normal finding in healthy dogs.

As the paired radius and ulna form the distal joint surface, any disparity of growth between these paired bones may result in a step incongruence. Negative radioulnar incongruence refers to short ulna, whereas positive radioulnar incongruence refers to a short radius. Incongruence is thought to play a major part in developmental elbow disease in dogs. Step incongruence may result in overloading of the medial coronoid process (short radius) or anconeal process (short ulna), and the presence of RUI has been positively associated with cartilage lesions.

Diagnosing radioulnar step incongruence is not as simple as it may seem. Elbow joints with a step between the radius and ulna of  $\geq 2$  mm are considered to be incongruent. Radiography, computed tomography (CT) and arthroscopy have been used to assess elbow incongruence in dogs, with reconstructed CT considered the gold standard. However, imaging modalities do not appear to reliably predict arthroscopic assessment of RUI in either degree or location; RUI is most commonly detected at the ulnar commissure with CT and at the apex with arthroscopy.

Ulnar osteotomies and osteotomies may be indicated to correct elbow incongruence. Bi-oblique dynamic proximal ulnar osteotomy (BODPUO) was described in 2016 and has become the most common configuration of proximal ulnar osteotomy performed. When BODPUO is performed correctly there is no need for implants and the risk of triceps inclining the proximal fragment caudally is reduced. However, as the ulna is not stabilized, there is

often postoperative discomfort and the risk of non-union. Some surgeons prefer to stabilize a proximal ulnar osteotomy or perform distal ulnar osteotomy or ostectomy. In-vitro analysis of distal ulnar osteotomy suggests comparable outcomes to proximal ulnar osteotomy, but only if the interosseous ligament is released. Distal ulnar ostectomy is often performed in growing dogs with premature closure of the distal ulnar physis to permit continued radial growth and to limit the effect of short ulna and RUI within the elbow joint. Definitive angular and length corrections may be performed when the dog is skeletally mature.

There is still significant work to be done to understand the full spectrum of RUI beyond simple step incongruence and to identify the most effective strategies to restore elbow congruence.

### KEY LEARNING OBJECTIVES

- Recall the complex anatomy of the elbow joint and understand the various forms of elbow incongruence and their effects on elbow development
- Explain the limitations of various diagnostic modalities for elbow incongruence
- Discuss treatment strategies for elbow incongruence

### MULTIPLE CHOICE QUESTIONS

1. What is the most common form of elbow incongruence?
  - (A) Elliptical trochlear notch
  - (B) Radioulnar step incongruence
  - (C) Dynamic radioulnar step incongruence
  - (D) Radioulnar rotational incongruence
2. What amount of radioulnar step defect is considered incongruence?
  - (A) Any
  - (B) 1 mm
  - (C) 2 mm
  - (D) 3 mm
3. What is the direction of cut in bi-oblique proximal ulnar osteotomy?
  - (A) Beginning proximal, caudal and lateral and aiming distal, cranial and medial
  - (B) Beginning proximal, caudal and medial and aiming distal, cranial and lateral
  - (C) Beginning distal, caudal and medial and aiming proximal, cranial and lateral
  - (D) Beginning distal, caudal and lateral and aiming proximal, cranial and medial

Sunday 7 April  
Hall 8

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# Safety stream

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- 410 08:45–09:30  
**Pre-op safety and preparation: what really helps and do pre-op bloods improve outcome?**  
Matt Read
- 411 10:05–10:55  
**How equipment harms patients**  
Matthew McMillan
- 412 11:00–11:45  
**How to use checklists to improve safety (and how not to)**  
Matthew McMillan
- 413 13:05–13:50  
**What anaesthetic monitoring really helps?**  
Matthew McMillan
- 414 14:00–14:45  
**Clinical audit: how to set up**  
Pam Mosedale
- 414 14:55–15:40  
**An anaesthetist's day from hell: what we can do after things go wrong**  
Matthew McMillan and Matt Read
- 415 15:50–16:35  
**Mortality and morbidity rounds in veterinary practice**  
Catherine Oxtoby

## Pre-op safety and preparation: what really helps and do pre-op bloods improve outcome?

**Matt Read**

This session will review what is currently known about anaesthetic risk in small animal patients. The factors that are known to increase a patient's risk of dying will be discussed, as well as the indications for, and limitations of, preoperative blood testing and other diagnostics as they relate to patient risk. The results of several studies on adverse incidents and patient safety will be reviewed.

Including some excellent studies from researchers in the UK, investigators from around the world have conducted numerous studies in attempt to learn about the factors that affect the risk of a dog or cat dying as a result of anaesthesia. One interesting area of research is the relationship between the usefulness of conducting preoperative blood work and patient risk. Although preanaesthetic screening is generally well accepted by today's clients, the value of performing these sometimes expensive tests as a way of minimizing anaesthetic risk remains somewhat controversial.

Studies relating preanaesthetic laboratory testing to risk in people have failed to support the case for routine preoperative hematological and biochemical testing in the absence of abnormalities in history or physical examination. However, in veterinary medicine, we deal with indirect and relatively subjective histories provided by the owner, and the quality of the information we receive may mean that some abnormalities may remain unreported or undetected. For this reason, laboratory testing might detect more underlying disease in animals than it does in people.

The veterinary literature provides us with important information about the benefits of performing diagnostic work-ups prior to anaesthesia. In general, the criteria that are used to determine which tests should be performed are based on a patient's state of health and/or age. To be most effective, methods of patient assessment, whether it be blood work, radiographs, ultrasound examination, etc., should focus on the patient's cardiac, pulmonary, renal and hepatic functioning, since these are the body systems that are most likely to have underlying dysfunction, be affected by the anaesthetic agents that will be used, or be affected by the alterations in normal physiology as a result of the surgical procedure.

Veterinary studies have shown that if patients undergo preanaesthetic blood work, up to one third of 'normal' patients will have abnormalities that were not able to be detected based on history taking or physical examination alone. Most commonly, signs of haemoconcentration and elevations in kidney or liver enzymes

result in reallocation of ASA status to a higher level, and, in some cases, the anaesthetic procedure will be delayed or cancelled while the patient is stabilized or the abnormalities are worked up further. Although anaesthetic protocols (i.e. drugs and doses) are infrequently altered as a result of these new findings, modifications to the patient's overall anaesthetic management can be made, including preoperative fluid support, plans to more aggressively monitor and treat blood pressure or other parameters under anaesthesia, etc. By working to stabilize the patient prior to anaesthesia, its overall risk can be lessened.

However, the opposite is not true. 'Normal' blood work does not mean that problems cannot occur. Equipment malfunction, human error and the depressive cardiopulmonary effects of the drug can still happen, and it is very important not to promote or offer preanaesthetic screening to pet owners in such a way that they will assume that if the results come back unremarkable, the anaesthetic and recovery will also proceed without incident. Normal blood work does not guarantee anything other than the bill to the client being a little bit higher.

### KEY LEARNING OBJECTIVES

- List at least three of the documented factors that increase the risk of anesthetized dogs and cats dying in the perioperative period
- Discuss the usefulness of performing blood work as it relates to anaesthesia safety and patient outcomes
- Recognize at least two steps that could be taken in your own clinic to decrease patient risk prior to anaesthesia

### MULTIPLE CHOICE QUESTIONS

1. Which of the following have been shown to increase anaesthetic risk in small animals?
  - (A) Use of pulse oximetry for patient monitoring
  - (B) Dogs and cats that are greater than 12 years old
  - (C) Dogs that are heavier than 5 kg
  - (D) Patients that have been assigned an ASA patient status of 1 or 2
2. Which of the following statements is TRUE?
  - (A) Human error is rarely a root cause of adverse anaesthetic incidents
  - (B) Introduction of checklists into anaesthetic practice is typically met with great enthusiasm and they are usually easily adopted
  - (C) Instituting a 'time out' prior to induction of anaesthesia can decrease the occurrence of adverse incidents
  - (D) Performance of preoperative blood work can reduce the incidence of common anaesthetic complications such as hypotension and hypoventilation

3. Which of the following is true in terms of small animal anaesthetic risk?

- (A) Cats are higher risk than dogs
- (B) Healthy small animals are at less risk of dying than healthy people

(C) Time of day has no effect on a patient's risk of dying

(D) Intubation of cats lowers their risk when used for short, uncomplicated procedures

## How equipment harms patients

**Matthew McMillan**

Modern machines and electronic equipment are very safe. They rarely go wrong in a way that could harm an animal. What tends to go wrong is our use of these machines. Failure to check equipment prior to use and to regularly service it is an example of where corners are cut, often with the well intentioned desire of reducing time spent on a task or to costs for the owner. However, there are risks involved with these omissions. For example, an anaesthetic machine oxygen flow failure is far more likely to be due to a human not checking the level of gas in a cylinder than it is the flowmeter or pipeline failing.

Where a risk with a piece of equipment is known then there are generally ways of mitigating this risk, which should be performed whenever using that piece of equipment. When harm occurs more often than not it is due to the fact that a human has not fully performed these mitigating tasks. For example monopolar cautery is known to pose a risk of burns. However, if the site of the monopolar plate is properly prepared and fully in contact with an animal, over the flank or back, and no electronic wiring, for example from the anaesthetic monitor, is placed across the animal, then that risk is minimized. Missing one of these tasks, however, can lead to a burn. Harm may not result every time a piece of equipment is used inappropriately but the risk is there and at some point an animal will be injured. Heat mats and dental descalers/polishers are known to also cause burns in certain circumstances, but this is unlikely if they are used within certain limits.

As veterinary surgeons we are great innovators and make doers. We are generally used to not having all the equipment we may need for a task so we adapt and alter existing equipment to fit our needs or make do with equipment which does not have feature that may be desirable or which is out of date. This innovative streak has made us extremely successful and often allowed us to perform tasks that previously would not have been possible. However, this adaptation can have unforeseen circumstances.

Finally, anaesthetic monitoring can also harm but typically not in an obvious way. Most commonly we have an optimistic obsession with numbers; we like to believe happy numbers and disbelieve bad ones, so we often fail to interpret how these numbers were generated.

This misinterpretation of monitored parameters can cause us to miss impending crises which may risk serious harm to our patients. On the flipside, overinterpreting a number can lead to us treating a problem that is not really there and no intervention is without the risk of harm.

### KEY LEARNING OBJECTIVES

- Recognize that everyday equipment can harm patients
- Recognize that the risks posed by equipment are typically due to misuse
- Recognize that monitoring equipment can harm patients through over- or underinterpretation and subsequent action or inaction

### MULTIPLE CHOICE QUESTIONS

1. Which of the following is the appropriate maximum intracuff pressure for PVC high-volume, low-pressure cuffs?
  - (A) 15 cmH<sub>2</sub>O
  - (B) 30 cmH<sub>2</sub>O
  - (C) 45 cmH<sub>2</sub>O
  - (D) 60 cmH<sub>2</sub>O
2. Which of the following statements about electrocautery burns is FALSE?
  - (A) Monopolar has less risk of burns than bipolar
  - (B) Insulated quivers can reduce the risk of accidental firing
  - (C) Monopolar burns are more likely to occur when there is only partial contact between the patient and the diathermy plate
  - (D) Short circuits between a monopolar hand-piece and electrical wiring or a metal table can lead to burns
3. Which of the following is NOT recommended when using electrocautery or laser techniques in and around an animal's upper airway or oral cavity?
  - (A) Use nitrous oxide to avoid using 100% oxygen
  - (B) Use wet swabs to protect the endotracheal tube
  - (C) Ensure a seal between the endotracheal tube and trachea
  - (D) Have a fire blanket or bucket of water immediately available



## How to use checklists to improve safety (and how not to)

**Matthew McMillan**

Checklists are often touted in the mainstream and scientific media as being a simple solution to improving patient safety. They are viewed as a straightforward way to ensure that critical tasks are performed and therefore act to reduce the risk of tasks essential to safety being missed.

The WHO surgical safety checklist is perhaps the most famous safety checklist and produced some incredible results reducing complication rates such as surgical site infections as well as fatalities in a wide range of socioeconomic environments. However, the WHO checklist was not always successful. Part of this lack of universal success was because it is the performance of the tasks themselves not the performance of a checklist which improves safety; checklists are not a box-ticking exercise for clinical record and bureaucratic purposes. Just having a checklist there does not confirm that the tasks will be performed in a proper and timely fashion.

With this in mind, there are several cultural, organizational and human factors that can cause a checklist to fail. Many times checklists can fail because some of their main benefits are not taken into account; these benefits are communication and teamwork. Checklists require the entire team involved in the process to engage with them if they are to work. Everyone needs to be working from the same page and needs to have the critical information they need to ensure the task is performed safely. So proper implementation of checklists is key to their success but unfortunately this often faces difficulties.

For example, some people view checklists as a waste of time, arguing the tasks outlined are always performed. In truth actually many of these tasks, despite being vital and often simple, are too easily missed in the complex hustle and bustle of practice. That these omissions do not lead to harm is often just a matter of luck. Others argue against the use of checklists as they view them as interfering with their clinical judgement. However this view is also flawed, checklists shouldn't dictate work but merely act as a scaffold; they are not an algorithm as such, they just ensure all critical tasks have been performed. They may in fact free up the clinician's mind, allowing their clinical judgement and decision making to flourish unimpeded by improving recall and reducing the necessity to remember all the critical tasks and all common differentials. The decision making still belongs to the clinician but the reliance on memory is removed.

This principle is perhaps best demonstrated in aviation-style crisis checklists, for which large amounts of safety data have accumulated over the last 50 years. With this in mind a number of checklists for crises during anaesthesia and surgery have recently been developed. In simulator settings these have been demonstrated to reduce the time to diagnosis and intervention as well as reducing omissions of critical steps and considerations. These could help teams in veterinary settings react to complications rapidly and effectively when interventions are time critical.

So the problem with checklists is predominantly in the way that they are used. They are not the solution to all safety problems but they can have a role to play in improving safety.

### KEY LEARNING OBJECTIVES

- Recognize the value of checklists in improving patient safety
- Recognize that checklists will only work as part of a wider cultural change
- Recognize the importance of communication and teamwork in making checklists work successfully

### MULTIPLE CHOICE QUESTIONS

1. Which of the following is not on the WHO Surgical Safety Checklist?  
(A) Owner consent  
(B) Administration of antibiotics where appropriate  
(C) Communication of anaesthetist concerns  
(D) Risk of blood loss
2. In the study reported by Hofmeister et al. (2012) which of the following was not introduced as a patient safety intervention?  
(A) Full anaesthetic machine check  
(B) Checklist comprising of 'technician confirmed intubation' and 'technician checked operating room'  
(C) Unique coloured bandage for wrapping arterial catheters  
(D) Prior to administration, individuals will read out loud the drug name, patient name and route of administration
3. In the study reported by Hofmeister et al. (2012), what was the most common safety incident?  
(A) Medication errors  
(B) Oesophageal intubation  
(C) Closed APL valves  
(D) Wrong site surgery



# What anaesthetic monitoring really helps?

**Matthew McMillan**

Physiological monitoring undoubtedly improves safety in anaesthesia. Anaesthesia can be thought of as controlled, reversible intoxication of the central nervous system which also has profound secondary effects on homeostasis. Most importantly for patient survival, anaesthetics impair the respiratory and cardiovascular systems. Although we often take it for granted, during anaesthesia we put the patient in a fragile state, completely at the mercy of the anaesthetist. Many times we are only saved from the unenviable position of telling an owner their animal has had a problem under anaesthesia and been harmed or worse died by the robustness of our patients and their ability to recover after an insult.

Fortunately there is an array of methods for monitoring patients under anaesthesia. These range from basic hands-on monitoring to advanced electronics.

Even in the age of multiparameter monitors when pulse oximetry, blood pressure, end-tidal carbon dioxide monitoring and electrocardiography can all be easily displayed, an anaesthetist's senses of sight, hearing and touch are still vital. One of the most basic skills in anaesthesia, assessing the depth of anaesthesia, is far easier and more reliable when performed by a welltrained anaesthetist than it is when measured by one of the numerous electronic machines designed for this purpose. The ability to assess pulses manually and observe the chest and reservoir bag of the breathing system moving are still invaluable in the rapid assessment of a patient at critical times such as post induction and in a potential crisis.

Where electronic monitors are giving good data, they still require someone to interpret the waveform and numbers produced, as even modern machines are prone to give false information and an ability to perform quality control on the data is critical. Moreover, it takes advanced clinical reasoning to take the data from the various monitoring modalities being used, interpret and cross-reference it and then put it together to gain an overall picture of the patient's physiological state. As such, electronic monitors should be considered as an extension of the anaesthetist's senses not a replacement for them.

Saying this, electronic monitoring can give incredibly useful data that can help us make decisions and interventions throughout an anaesthetic to keep the patient safe if they are used properly. Alongside monitoring classic

numbers generated by monitors, such as heart rate, respiratory rate, SpO<sub>2</sub>, blood pressure and end-tidal carbon dioxide tensions, there are also some slightly more complex waveform analyses that can be performed and applied to our patients. Pulse profile variation can give an indication of a patient's volume status. Capnography not only tells us how well a patient is ventilating but also gives information on the patency of the airway and breathing system, the adequacy of fresh gas flow, and can help identify airway obstructions and sudden changes in cardiac output. All of these can be quickly identified by a knowledgeable anaesthetist.

In conclusion, despite massive advances in technology, the most important factor in anaesthetic monitoring is still the anaesthetist. We are a long way off a well-trained anaesthetist being replaced.

## KEY LEARNING OBJECTIVES

- Recognize that all electronic monitors depend on appropriate interpretation by a trained anaesthetist
- Recognize that all electronic monitors are prone to error
- Recognize that the numbers that a monitor generates are not the only useful data they produce

## MULTIPLE CHOICE QUESTIONS

1. Which of the following does not reduce the signal quality and therefore accuracy of pulse oximetry?  
(A) High carbon dioxide tensions  
(B) Ambient light (fluorescent strip lighting)  
(C) Poor pulse strength  
(D) Anaemia
2. Which gases/vapours can cause errors in capnography measurement?  
(A) Oxygen and nitrous oxide  
(B) Nitrogen and oxygen  
(C) Nitrogen and nitrous oxide  
(D) Isoflurane and sevoflurane
3. Approximately what proportion of adverse events in anaesthesia could be identified by the combination of pulse oximetry, capnography and blood pressure monitoring?  
(A) 39%  
(B) 67%  
(C) 76%  
(D) 93%

# Safety stream

## Clinical audit: how to set up

**Pam Mosedale**

Understanding the performance of your practice is critical, if you don't measure it you don't know what needs to improve. Clinical audit can assess many areas such as outcome, process and performance. This presentation will point out the difference between clinical audit and in-practice research. It will discuss outcome audits, process audits, structure audits and significant-event audits and where each is appropriate.

Choosing an area to audit, choosing the right type of audit and motivating the team are all important to the success of the audit. To overcome barriers to audit it is important that careful planning, involving the whole of the team who will be involved, occurs right from the start. The subject chosen must be relevant to the team, easily measurable, happen often enough and have a possibility of change or improvement.

Once a subject has been chosen then suitable criteria need to be selected, a standard or target set, and the method for collecting the data shared with the team. The data then need to be analysed, any changes needed as a result implemented, then after a while a re-audit should take place. Another result of the audit might be deciding that protocols or clinical guidelines are needed, and looking at the evidence base in order to draw these up.

Examples of how outcome audits, benchmarking and process audits can be implemented will be given.

All practices could benefit from auditing commonly carried out procedures or processes. This has an important role to play in improving clinical effectiveness and patient safety.

### KEY LEARNING OBJECTIVES

- The different types of clinical audit
- How to choose a subject to audit
- How to set up an audit in your practice

### MULTIPLE CHOICE QUESTIONS

1. Which of the following is true for clinical audit?  
(A) It answers the question what is best practice  
(B) It is a process for monitoring and assessing clinical care  
(C) It needs ethical approval  
(D) It must be statistically significant
2. What does an outcome audit do?  
(A) Looks at how we follow protocols in practice  
(B) Checks we have the right facilities available  
(C) Looks at the results of a procedure  
(D) Follows one case through from beginning to end
3. What may a clinical audit result in?  
(A) Changing protocols or guidelines  
(B) Establishing protocols or guidelines  
(C) Training or CPD for the team  
(D) All of the above

## An anaesthetist's day from hell: what we can do after things go wrong

**Matthew McMillan and Matt Read**

All of us are capable of experiencing a bad day. Perhaps one of the worst days for a veterinary surgeon or veterinary nurse is one where things go wrong and a patient is subsequently harmed when 'under our care'. This is especially poignant if mistakes are made in patient management. As an anaesthetist this is a significant problem as often, if things do go wrong, they go wrong in an acute and extreme manner and there may be little or no time to correct them. This can lead to the patient rapidly deteriorating and potentially even result in the patient's death.

The uncomfortable truth is that most complications in anaesthesia are associated with the drugs we are administering or the procedure we are performing. A patient's underlying health undoubtedly has a part to

play, but through the pharmacological manipulation of its central nervous system, a patient invariably experiences some degree of cardiovascular and respiratory compromise as well. Although some side effects may be unavoidable, many can be managed if predicted and planned for appropriately.

References on how to manage perianaesthetic crises are numerous. They typically outline what to do when a patient is hypotensive or tachycardic, the things that should be checked and the interventions that should be performed. Other literature will tell you how to plan for these crises in advance, such as what risk factors to look out for when performing preanaesthetic patient assessments. What is less common is information on how to investigate and consider critical incidents after the fact, once the situation has come to an end.

In the immediate aftermath, it is too easy for blame to be attributed to the person or piece of equipment in closest proximity to the incident. Often, the individuals involved will hold themselves personally responsible, taking the blame squarely on their own shoulders. Others may look to shift the blame elsewhere to someone or something else, such as a colleague or a piece of equipment. The truth, however, is messier. Most incidents have a number of factors involved in their generation. They evolve through a chain of events and contributing factors

all coming together in a perfect storm. These incidents do not simply occur out of the blue, but, rather, are the result of a set of factors which existed long before the event. An important first step when investigating significant events is to properly identify what these contributing factors might be. There are many different ways of analysing events from simple 'ask why five times' through to more complicated multilayer 'systems' or 'human factors' analysis. Thankfully, it is possible to modify these techniques into a form that can be effectively performed in veterinary practices.

Using these methods allows us to create a picture of the weaknesses within a practice's systems and processes. This can help to establish why individuals acted and thought in the way they did, can highlight gaps in their knowledge, training, experience and supervision, and identify issues with communication, teamwork, distraction and organization. This information can then be used to adapt the practice to work in a more safety-conscious manner. In this way, complications can be turned into learning experiences that can benefit patients and the veterinary team in the future.

This session will use real-life examples of adverse anaesthetic events to illustrate how easily things can go wrong in practice and to show how the staff responded to them in attempt to prevent similar problems from happening in the future.

### KEY LEARNING OBJECTIVES

- Recognize that complications, significant events, near misses and error can all be used as learning experiences to improve future patient care

- Recognize that in most circumstances a number of contributing factors can be identified in the lead-up to a significant event
- Recognize that attributing blame to individuals or to a piece of equipment does not help to reduce the chance of a similar problem occurring again

### MULTIPLE CHOICE QUESTIONS

1. According to the 2018 study by McMillan & Lehnus, which of these was the most common contributing factor identified in safety incidents?
  - (A) Lack of knowledge
  - (B) Lack of experience
  - (C) Equipment malfunction
  - (D) Decision making
2. According to the 2018 study by McMillan & Lehnus, what approximate percentage of safety incidents which involved an individual factor also involved either an organisational, teamwork or environmental factors?
  - (A) 25%
  - (B) 50%
  - (C) 66%
  - (D) 90%
3. Which of these is NOT a recognized method of safety incident analysis?
  - (A) Ask why five times
  - (B) Systems analysis
  - (C) Fishbone analysis
  - (D) Keystone analysis

## Mortality and morbidity rounds in veterinary practice

**Catherine Oxtoby**

Mortality and morbidity rounds have been traditional methods of discussing poor outcomes and mistakes in medicine since the early 20th century. They provide a format for the discussion of errors, the aim of which is to learn from and prevent the recurrence of mistakes or poor-quality care. They have more recently been viewed as a mechanism to improve patient safety, medical knowledge and facilitate quality improvement.

Mortality and morbidity rounds are being used more and more in veterinary practice, to varying degrees of effectiveness. Described by the RCVS Practice Standards Scheme as 'honest open discussions' with clear actions and no barriers to feedback, to be held face to face, at least monthly and demonstrate evidence of change. However, the concept of mortality and morbidity rounds

has been described as 'familiar yet lacking in clear definition' in the veterinary literature.

Structured formats for running such meetings have been developed in human healthcare, the aim of which is to increase the quality of mortality and morbidity rounds, improve the case selection, analysis and distribution of meeting summaries and to increase the amount of positive change and improvement initiatives from meetings. Frameworks such as the Ottawa M&M model offers a structure to facilitate these discussions which can be adapted for use in the veterinary setting, together with adverse event data gathering systems such as VetSafe, the Veterinary Defence Society's error reporting system.

However, barriers to successful mortality and morbidity meetings are often present. Reflective learning in the public domain can be difficult, embarrassing and nerve wracking. Clinicians who are involved in errors which harm their patients are often themselves traumatized by the event, leading to 'second victim' syndrome. It is important therefore that meetings are conducted in a constructive and supportive environment, with the use of human factors frameworks to identify contributory factors and the explicit aim of identifying system changes, rather than seeking to blame or punish individuals.

# Safety stream

## KEY LEARNING OBJECTIVES

- Identify the benefits of mortality and morbidity rounds and their place in the RCVS Practice Standards Scheme
- Identify the potential barriers to mortality and morbidity rounds
- Describe a format for running effective mortality and morbidity rounds

## MULTIPLE CHOICE QUESTIONS

1. How frequently does the RCVS PSS demand that mortality and morbidity rounds are undertaken?  
(A) Monthly      (B) Weekly

- (C) Quarterly
  - (D) Following any significant event
2. What is the main aim of mortality and morbidity rounds?  
(A) Improve patient safety  
(B) Institutional quality improvement  
(C) Medical education  
(D) All of the above
  3. 'Second victim' refers to the effect of clinical error on whom?  
(A) The patient  
(B) The clinician  
(C) The organization  
(D) The owner

Sunday 7 April  
Telford Room, Austin Court

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# VDS Training

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- 418 09:00–09:45  
**Taking time out to get time back**  
Penny Barker
- 418 09:55–10:40  
**The three Ps for having a good day: present, proactive and positive**  
Carolyne Crowe
- 419 11:15–12:00  
**Leaning into colleagues, clients and cases**  
Carolyne Crowe
- 420 12:10–12:55  
**Stepping up and speaking out**  
Penny Barker

## Taking time out to get time back

**Penny Barker**

With so many demands and everyone wanting a piece of you – both in your personal and professional life – it is important to be both effective and efficient with the time you have. Unfortunately, what often happens is that you get caught up on the hamster wheel, feeling out of control, not getting anything done or feeling that you are letting people down.

We often talk about 'time management' whilst what we really need to do is manage ourselves better and be purposeful and proactive with our time. In order to feel in control, we need to understand each of our roles and what are the priority tasks, both for us and for other people – what is important and what is urgent and how we differentiate between them. Once we have done this we can then determine which of the tasks we need to do, in what order, and which we can delegate or simply leave.

Procrastination leads to feelings of frustration and guilt. We often do it when we feel out of control which only reinforces the feeling of being overwhelmed. Taking active control of our tasks and our time and breaking things down into manageable, time-boxed chunks are just some of the strategies that can help us to make tangible progress.

Being aware of our own natural preferences is a key part of self-management. Some people are focused on results, which helps get things done but are they the right things? Others are more concerned with detail and accuracy, which creates high-quality work but can also lead to a lack of progress and decisionmaking. Some people love variety but this can lead to them volunteering for too many tasks with little sense of priority. Many people are great team players but find themselves putting the needs of other people ahead of their own and unable to

say 'no'. Understanding how and why we trip ourselves up helps us to put strategies in place to overcome our natural tendencies, making us more effective and resilient.

Take time to think how you want to show up to the day and what you need to accomplish. Check in with yourself at regular intervals and assess whether you are on track or if things have changed; this helps to keep you in control and gives you time to think. It allows you to be flexible and responsive whilst still focusing on what's important to you.

### KEY LEARNING OBJECTIVES

- Learn how to feel more in control by prioritizing your tasks effectively
- Understand what procrastination is and key strategies to overcome it
- Understand how being purposeful and proactive helps you to balance your roles in practice

### MULTIPLE CHOICE QUESTIONS

1. Which book by Brian Tracy has great tips for beating procrastination?  
(A) Eat that Frog!  
(B) Eat that Camel!  
(C) Eat that Horse!  
(D) Eat that Giraffe!
2. Which is a useful way of prioritising tasks?  
(A) Urgent, useful  
(B) Urgent, important  
(C) Important, useful  
(D) Urgent, impactful
3. Which categories should all tasks go into?  
(A) Do, dump, despair, decide  
(B) Do, delegate, deliver, drop  
(C) Deliver, dump, delegate, drop  
(D) Do, ditch, defer, delegate

## The three Ps for having a good day: present, proactive and positive

**Carolyn Crowe**

In order for us to be successful and happy in both our personal and professional lives, we need to know what's important to us and what outcomes we want to achieve. This allows us to be proactive in our approach to getting it, taking positive steps towards our goals and being present in the moment, aware of whether we are on track or if we need to take action to get back on course. This is the essence of personal leadership and helps us to get what we need and want from each day as well as fulfilling our roles and responsibilities.

What does a good day at work look and feel like for you? What's happening to make it a good day? Setting ourselves up for success requires a proactive and purposeful approach to our day. How can you start feeling refreshed and ready to go? What other preparations do you need to put in place to save you time and mental energy during the day?

Take time to consider your potential challenge points – what could stop you from having a good day? What outcomes do you need from these situations? Think about how you can approach these situations positively and with purpose.

During the day, try to be 'mindful' and keep yourself in the present – this stops your mind ruminating about the future and worrying about the past. Press pause periodically and check in with yourself. Think about what's going well and what needs to change to keep you on track. This allows you to keep a sense of control and to be aware of what's going on for you rather than being swept along by people and circumstance.

Personal leadership is for everyone, whatever your position in practice. Actively working to be more present, proactive and positive will help you to have more good days and feel more fulfilled at work and at home.

### KEY LEARNING OBJECTIVES

- Learning how to set yourself up for success on a daily basis, whatever the challenges
- Knowing the benefits of being present, proactive and positive through the day
- Defining what a 'good day at work' is for you and how to have more of them

### MULTIPLE CHOICE QUESTIONS

1. Why is personal leadership is important?
  - (A) Everyone will follow you

- (B) You are the boss
  - (C) It makes every day a good day
  - (D) It allows you to be in control of yourself and your time

2. What does being mindful require us to do?
  - (A) Be present and focus our attention on the moment
  - (B) Close our eyes and focus on breathing
  - (C) Meditate
  - (D) Be relaxed all the time
3. Why is having a good day important?
  - (A) The practice makes more money
  - (B) You get a lunch break every day
  - (C) You are happy, healthy and connected
  - (D) Everyone gets on all the time

## Leaning into colleagues, clients and cases

**Carolyne Crowe**

Working with people is a key part of our profession; every day we are interacting with clients, colleagues and our bosses and this is often the part of the job that is most difficult and stressful. Do you find yourself frustrated by people not doing what you want or expect them to do, or in a conflict situation over something seemingly trivial? Do certain clients or colleagues make you feel anxious or irritated, or do you simply find some people hard to read or talk to?

We are taught to 'treat others like you would wish to be treated', but in reality, we need to treat others the way that they would wish to be treated. If we are able to do this, we are much more likely to get the best out of them and, in turn, to get the best out of any given situation. It means, however, that we need to know more about them. We also need to understand that people are not their behaviour; what we see and hear can give us useful information about how to interact with them, but we should refrain from judgement, as we know little about them at a deeper level.

People are different, but they are predictably different. Learning how to identify different behaviours and preferences gives you the opportunity to flex your own style; you cannot choose how another person will respond to you but you can maximize your chances of a positive response by communicating with them in the right way. Pay attention to how other people are interacting with you, both through their verbal and non-verbal communication. This helps you to develop your emotional intelligence (EI), being aware of yourself and of the impact that you are having on others. EI is something that can be developed and is a key part of personal leadership.

Knowing more about the different behavioural styles allows you to recognize your own strengths and challenges.

It helps you to understand when you are tripping yourself up and when you are at your best. This allows you to communicate effectively and to influence positive behaviours. Through doing this you will improve your client interactions and get the best out of your colleagues, creating a happier and more productive working environment.

### KEY LEARNING OBJECTIVES

- Understanding your own and others behaviours and preferences
- Knowing the key principles of emotional intelligence (EI) and why EI is important
- Learning how to get the best out of every interaction

### MULTIPLE CHOICE QUESTIONS

1. What are the the four different behavioural styles?
  - (A) Dominant, influencing, steady and compliant
  - (B) Direct, inspiring, slow and cautious
  - (C) Dominant, influencing, supportive and correct
  - (D) Determined, insightful, steady and critical
2. What does emotional intelligence require?
  - (A) Self-awareness and the ability to ability to manage ourselves
  - (B) A high IQ
  - (C) To like everybody
  - (D) Everyone to have done behavioural profiling
3. What do you need to do to get the best out of others?
  - (A) Flex your style and pay attention to what happens
  - (B) Manipulate them
  - (C) Put people in boxes according to their style
  - (D) Not be yourself

## Stepping up and speaking out

**Penny Barker**

Are you able to say 'no' to people when you need to, or to ask for what you want without anxiety? Do you sometimes feel steam-rolled by pushy clients or find that people don't do what you ask them? Would you like to feel more confident, more of the time?

Confidence and assertiveness are essential to feeling in control and being effective both at work and in our personal lives. They go hand in hand; if we lack confidence in ourselves we are unable to be assertive and this can not only hold us back, but further damage our self-belief, creating a negative spiral.

Confidence comes from knowing our strengths and capabilities, focusing on the outcome that we want to achieve and being able to recognize the challenges that we may face. It requires us to be realistic in the expectations we set ourselves and others. Confidence is not about always knowing the answer or how to fix every problem, it's about believing that you have the ability to handle whatever comes up.

Our ability to be assertive is directly related to how we handle conflict; our so-called 'fight, flight or freeze and play dead' response. Some people lack confidence and self-esteem, not believing that they have anything to offer and that everyone else is always better. This leads to overly passive behaviour and avoidance of conflict. Others are more aggressive, focusing on their own needs and unaware of the impact that they are having on others. Passive-aggressive people are not open about how they feel, looking after their own interests but avoiding confrontation.

Many people confuse assertiveness with aggression, often because the more aggressive people are the ones that seem to get their own way, although often only in the short term. Being assertive, however, is about being open

and honest about what's important to you and what your values are and then communicating this confidently and clearly. It requires us to respect the values and needs of others whilst knowing that we are not responsible for how they respond. Assertiveness allows us to create choice, both for ourselves and other people, and encourages collaboration towards a successful outcome.

### KEY LEARNING OBJECTIVES

- Understand the importance of knowing our strengths and values in both our personal and professional lives
- Know what confidence is and how to develop it
- Learn why being assertive is important and how to develop an assertive approach

### MULTIPLE CHOICE QUESTIONS

1. What do you need to do to be confident?
  - (A) Look at the evidence for your competence to handle a situation
  - (B) Know everything
  - (C) Have all the answers
  - (D) Stick your chest out and talk loudly
2. Which of the following is true about assertive people?
  - (A) They express what is important to them whilst respecting other people
  - (B) They get what they want every time
  - (C) They are aggressive
  - (D) They don't take responsibility for their actions
3. What will being more assertive help you to do?
  - (A) Get more of what you want and need
  - (B) Never have to do anything you don't want to
  - (C) Avoid any form of conflict
  - (D) Spend less time with clients



## Section VI

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# Clinical abstracts: oral presentations

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BSAVA has not corrected typographical errors.  
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Thursday 4 April  
Bolton Room

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# Nephrology & urology

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- 424 08:30–08:45  
**Double-blind, placebo-controlled, randomized study to evaluate the weight gain drug, mirtazapine transdermal ointment, in cats experiencing unintended weight loss: a post-hoc analysis of cats with suspected renal disease**  
Beasley Mason
- 424 08:45–09:00  
**Renaltec attenuates serum levels of indoxyl sulfate in geriatric cats**  
Jose Mottet
- 425 09:00–09:15  
**Prevalence and characterization of urinary cultures in owned dogs and cats from Spain**  
Anna Vila
- 425 09:15–09:30  
**Canine urinary extracellular vesicles as bactericidal agents *in vitro***  
Samantha Raettig
- 426 09:30–09:45  
**Developing methods to study the endothelial glycocalyx in cats**  
Sara Hillyer
- 427 09:45–10:00  
**Neutering and early-onset urinary incontinence in bitches under primary veterinary care in the UK: A VetCompass cohort study**  
Camilla Pegram
- 427 10:00–10:15  
**Effect of treatment of hyperthyroidism on serum SDMA concentrations and the utility of SDMA as a marker of chronic kidney disease in hyperthyroidism**  
Emma Tarrant

## Oral presentations

# Double-blind, placebo-controlled, randomized study to evaluate the weight gain drug, mirtazapine transdermal ointment, in cats experiencing unintended weight loss: A post-hoc analysis of cats with suspected renal disease

**Beasley Mason, Valentine Williams,  
Tianhua Hu, Jessica Lee, Melinda Poole**

Kindred Biosciences, Inc., Burlingame, USA

### OBJECTIVES

To evaluate the safety and effectiveness of mirtazapine transdermal ointment in cats with unintended weight loss. This post-hoc analysis was conducted in cats with

suspected renal disease, as there is a potential delayed clearance of mirtazapine in these cats.

### METHODS

Client-owned cats  $\geq 1$  year of age, weighing  $\geq 2$  kg, with a documented loss ( $\geq 5\%$ ) in body weight (BW) were included. Cats were treated once daily with either 2 mg/cat mirtazapine transdermal ointment (Kindred Biosciences, Inc.) or placebo ointment applied to the inner surface of the pinna for  $14 \pm 3$  days. Mean percent change in BW between the mirtazapine and placebo group was evaluated from Day 1-to-14. A post-hoc analysis was conducted to evaluate the subset of enrolled cats with suspected renal disease (defined as having urine specific gravity  $< 1.035$  and serum creatinine  $> 122 \mu\text{mol/L}$  [ $1.6 \text{ mg/dL}$ ] at baseline).

### RESULTS

A total of 230 cats were enrolled ( $n = 115$  in both groups). Of the intent-to-treat population, suspected renal disease was identified in 49 mirtazapine and 44 placebo cats. The mean percent change in BW was  $+ 3.9\%$  ( $\text{SE} \pm 0.8\%$ ) in the mirtazapine and  $+ 0.9\%$  ( $\pm 0.5\%$ ) in the placebo group ( $p = 0.0022$ ). There was no significant difference between groups in incidence of overall adverse events (AEs) ( $p = 0.774$ ) or behavioral AEs of vocalization ( $p = 0.1183$ ) and hyperactivity ( $p = 0.3637$ ).

### STATEMENT (CONCLUSIONS)

Daily topical application of mirtazapine transdermal ointment to the inner pinna of the ear effectively increased body weight within 14 days in client-owned cats with suspected renal disease experiencing unintended weight loss.

# Renaltec attenuates serum levels of indoxyl sulfate in geriatric cats

**Jose Mottet<sup>1</sup>, Nikolaus Kowolik<sup>2</sup>**

<sup>1</sup> Vera Icon, Tongeren, Belgium

<sup>2</sup> Porus GmbH, Monheim, Germany

### OBJECTIVES

Indoxyl sulfate (IS) is an important uremic toxin that originates from the metabolic breakdown of tryptophan into indole by intestinal bacteria and conversion into IS in the liver. Serum IS concentrations are directly related to loss

of renal function in cats and IS serves as a marker of progression risk in cats with chronic kidney disease (CKD). Renaltec has been shown to be a potent and selective binder of indole in the feline gut. The objective of this study was to evaluate the efficacy of renaltec in lowering serum IS levels in cats.

### METHODS

Eighteen apparently healthy geriatric cats (11–16 years) were divided into two groups. Twelve cats received 500 mg renaltec mixed with 10 gram of a liquid cat snack once daily for 56 days (treatment group) while 6 cats served as negative control. All cats received the same type of food. Blood samples were taken every 2 weeks and serum IS concentrations were measured by Liquid Chromatography Mass Spectrometry.

## RESULTS

The mean serum IS concentration dropped significantly from 1637.6 mg/L (day 0) to 650.6 mg/L (day 56) in the treatment group ( $p = 0.0058$ ) while no significant change was observed in the control group (from 323.8 mg/L on day 0 to 599.7 mg/L on day 56;  $p = 0.5670$ ).

## STATEMENT (CONCLUSIONS)

Daily administration of renaltec reduced serum IS levels by more than 60% in this cohort of cats after 8 weeks of treatment. Further studies are needed to investigate the effects of renaltec on IS levels in cats with confirmed CKD.

# Prevalence and characterization of urinary cultures in owned dogs and cats from Spain

**Anna Vila<sup>1</sup>, Eduardo Hernández<sup>1</sup>,  
Jaume Rodón<sup>2</sup>, Xavier Roura<sup>1</sup>**

- 1 Hospital Clínic Veterinari, Universitat Autònoma de Barcelona, Barcelona, Spain
- 2 Idexx Laboratories, Barcelona, Spain

## OBJECTIVES

Due to the lack of information among urinary tract infection (UTI) in Spain, our objective is to describe the prevalence and characterization of urinary tract pathogens in urine samples from dogs and cats with urinary clinical signs.

## METHODS

This is a cross-sectional study with records of canine and feline urine cultures from all Spain during a one-year

study period (March 2017–2018). The urine samples were collected from dogs and cats with clinical signs of UTI and delivered by the veterinary on duty to Idexx's laboratories for culture.

## RESULTS

A total of 9,957 (6772 canine; 3185 feline) urinary cultures were performed with 34.6% yielded positive. Although 110 different bacterial and fungal species were isolated, only 7 bacterial genera accounted for 90.6% of the urinary isolates, including: *Escherichia coli* (49.56%), *Proteus* spp. (12.12%), *Enterococcus* spp. (9.80%), *Staphylococcus* spp. (8.40%), *Klebsiella* spp. (4.55%), *Pseudomonas* spp. (4.03%), and *Streptococcus* spp. (2.11%). Among these genera, dogs had a generally higher predisposition than cats did, 39.29% and 24.7% respectively. Distributions of UTI diagnosis tended to be similar between species, although *Enterococcus* spp. had been more prevalent in cats. Infection with single bacteria was responsible for 93.76% of UTI in both species.

## STATEMENT (CONCLUSIONS)

Given the results of the present study, canine and feline UTI in Spain can be characterized as follows: (1) bacterial UTIs were more prevalent than in previous reports; (2) the vast majority of canine UTI were caused by single bacteria; (3) *Escherichia coli* was singularly the most prevalent agent in canine and feline UTI.

# Canine urinary extracellular vesicles as bactericidal agents *in vitro*

**Samantha Raettig<sup>1</sup>, Fiona E. Karet Frankl<sup>2</sup>,  
Tim Williams<sup>3</sup>**

- 1 School of Veterinary Sciences, University of Bristol, Bristol, United Kingdom
- 2 Departments of Medical Genetics and Division of Renal Medicine, University of Cambridge, Cambridge, United Kingdom
- 3 Department of Veterinary Medicine, University of Cambridge, Cambridge, United Kingdom

## OBJECTIVES

Urinary extracellular vesicles (UEVs) from healthy human volunteers exhibit bactericidal activity *in vitro* which is independent of the bacteriostatic urinary protein, uromodulin. Thus, UEVs are postulated to be innate immune effectors of the urinary tract. This study aimed to evaluate the bactericidal activity of canine UEV preparations.

## METHODS

Free-catch urine samples were collected from client-owned dogs. Triplicate aliquots of UEVs isolated by differential centrifugation were co-incubated with luminescent BL21 *E. coli*, previously transfected with the *luxCDABE* operon. Luminescence was determined half-hourly and area under the growth curve (AUC) calculated. UEVs were classified as bactericidal if AUC of BL21 *E. coli* co-incubated with UEVs was significantly lower

# Oral presentations

than AUC of BL21 *E.coli* co-incubated with phosphate buffered saline (control). Statistical comparisons were made using the Student's t-test. UEV preparations were immunoblotted for TSG101 (canonical UEV marker) and uromodulin, and quantified by densitometry.

## RESULTS

Samples were collected from 13 dogs (8 males, 5 females). UEVs from eleven dogs were classified as bactericidal (7 males and 4 females) and two as non-bactericidal. Uromodulin content of UEV preparations was not different between those with and without

bactericidal activity. Furthermore, UEV preparations that were non-bactericidal did not contain fewer UEVs (based on TSG101 densitometry) compared to bactericidal preparations, which could indicate bactericidal dysfunction of UEVs within these individuals.

## STATEMENT (CONCLUSIONS)

Canine UEV preparations from most dogs demonstrated *in vitro* bactericidal activity, therefore UEVs may also be innate immune effectors of the urinary tract in dogs. However, further work to exclude a bacteriostatic effect of canine uromodulin is warranted.

# Developing methods to study the endothelial glycocalyx in cats

**Sara Hillyer<sup>1</sup>, Chris Neal<sup>2</sup>, Rebecca Foster<sup>2</sup>, Angie Hibbert<sup>3</sup>, Severine Tasker<sup>1,3,4</sup>, Gavin Welsh<sup>2</sup>, Simon Satchell<sup>2</sup>, Natalie Finch<sup>2</sup>**

- 1 Bristol Veterinary School, University of Bristol, Bristol, United Kingdom
- 2 Bristol Renal, University of Bristol, Bristol, United Kingdom
- 3 The Feline Centre, Langford Vets, University of Bristol, Bristol, United Kingdom
- 4 The Linnaeus Group, Shirley, United Kingdom

## OBJECTIVES

The study objectives were: to visualise the endothelial glycocalyx for the first time in cats; to validate assays to quantify serum glycocalyx breakdown products (sulphated glycosaminoglycans [sGAG] and hyaluronan [HA]) in cats; and to compare serum glycocalyx breakdown products in healthy cats with those with hyperthyroidism and chronic kidney disease (CKD).

## METHODS

Uterine artery samples from healthy cats undergoing routine neutering were perfused with 0.1% Alcian

blue/2.5% glutaraldehyde/0.1M sodium cacodylate and fixed with 2.5% glutaraldehyde/0.1M sodium cacodylate, then visualised using transmission electron microscopy. Validation of an Alcian blue assay and commercially available ELISA were performed for measurement of sGAG and HA, respectively, in cat sera. Serum HA was measured in cats with hyperthyroidism (n = 9), CKD (n = 6) and in healthy cats (n = 9) and compared across groups by Kruskal-Wallis testing.

## RESULTS

Median (range) glycocalyx depth in uterine artery was 64.44 (37.28–119.34)nm. Non-specific binding in serum, particularly to albumin, prevented reliable measurement of sGAG with the Alcian blue assay. The HA ELISA was reliable. Median (range) HA in cats with hyperthyroidism, CKD and in healthy cats was 118.40 (50.11–636.88)ng/ul, 155.06 (41.17–517.00)ng/ul and 184.74 (62.92–532.36) ng/ul, respectively, with no significant difference across groups (P = 0.778).

## STATEMENT (CONCLUSIONS)

Definitive glycocalyx visualisation will facilitate its future study *ex vivo*. The HA ELISA enabled measurement of serum HA as a glycocalyx breakdown product in cats but HA was not significantly different across healthy cats and those with hyperthyroidism or CKD. However, this study was likely underpowered and larger studies are needed to evaluate glycocalyx breakdown in these diseases.

# Neutering and early-onset urinary incontinence in bitches under primary veterinary care in the UK: A VetCompass cohort study

**Camilla Pegram<sup>1</sup>, Dave Brodbelt<sup>1</sup>,  
David Church<sup>1</sup>, Jon Hall<sup>2</sup>, Laura Owen<sup>3</sup>,  
Yu-Mei Chang<sup>1</sup>, Dan O'Neill<sup>1</sup>**

<sup>1</sup> The Royal Veterinary College, Hatfield, United Kingdom

<sup>2</sup> University of Edinburgh, Edinburgh, United Kingdom

<sup>3</sup> University of Cambridge, Cambridge, United Kingdom

## OBJECTIVES

Urinary incontinence commonly affects bitches and has been attributed to neutering. This study aimed to evaluate associations between neutering and early-onset ( $\leq 8$  years) urinary incontinence (EUI) in bitches under primary veterinary care in the UK.

## METHODS

This retrospective cohort study followed bitches within VetCompass born from January 1st 2010 to December 31st 2012 over time until 31st March 2018. EUI cases were identified and the incidence risk over the study period was calculated. Cox regression modelling evaluated the hazard of neutering for EUI outcome a) from the date of birth for all bitches both neutered and entire and b) from the date of neutering for just the neutered subset of bitches. Confounding variables considered included breed, bodyweight and veterinary practice group.

## RESULTS

The study included 493 EUI cases and 72 478 non-cases. Incidence risk was 0.68% (95% confidence intervals 0.62 to 0.74). After accounting for confounding factors, increased hazard of EUI was identified in a) neutered bitches, with the effect increasing with age and b) bitches neutered prior to 6 months within the first two years following neuter. In both models, increased hazard was additionally associated with increasing bodyweight and the Irish setter had the highest hazard of EUI by breed.

## STATEMENT (CONCLUSIONS)

Neutering and early-age neuter ( $< 6$  months) were identified as major time-dependent factors associated with increased EUI. Although neutering decision-making cannot be just based on EUI risk alone, the reduced time to EUI diagnosis in early-neutered bitches is a consideration, particularly in high-risk breeds and bitches of larger bodyweights.

# Effect of treatment of hyperthyroidism on serum SDMA concentrations and the utility of SDMA as a marker of chronic kidney disease in hyperthyroidism

**Emma Tarrant, Tim Williams**

Department of Veterinary Medicine, University of Cambridge, Cambridge, United Kingdom

## OBJECTIVES

To compare serum SDMA concentrations in hyperthyroid cats before and after medical treatment and evaluate the sensitivity and specificity of serum SDMA and creatinine

concentrations for concurrent chronic kidney disease (CKD) in hyperthyroidism.

## METHODS

Hyperthyroid cats that commenced medical treatment and in which euthyroidism was achieved ( $n = 12$ ) were identified from samples submitted to Central Diagnostic Services, Cambridge. Cats that were azotaemic before ( $n = 3$ ) and/or after treatment ( $n = 4$ , up to 8 months) were classified as having concurrent CKD. SDMA concentrations (measured in stored frozen samples) in hyperthyroid cats pre- and post-treatment were compared using Wilcoxon signed-rank test. Sensitivity and specificity of elevated pre-treatment serum creatinine ( $> 153 \mu\text{mol/L}$ ) and SDMA concentrations ( $> 14 \mu\text{g/dL}$ ) for concurrent CKD were calculated. Data are presented as median [range].

## RESULTS

Serum SDMA concentrations did not change significantly after 1 month (pre-treatment 14 [7–21]  $\mu\text{g/dL}$  vs. 1 month post-treatment 17 [11–29]  $\mu\text{g/dL}$ ,  $n = 6$ ;  $P = 0.248$ ) or 3–8 months of treatment (3–8 months post treatment 17 [9–30]  $\mu\text{g/dL}$ ,  $n = 10$ ;  $P = 0.167$ ). Sensitivity and specificity of elevated pre-treatment serum SDMA

## Oral presentations

concentrations for concurrent CKD were 43% (95% confidence interval [CI] 10–82%) and 80% (95% CI 28–100%) respectively. Sensitivity and specificity of elevated pre-treatment serum creatinine concentrations for concurrent CKD were 43% (95% CI 10–82%) and 100% respectively (95% CI 48–100%).

### STATEMENT (CONCLUSIONS)

Serum SDMA concentrations did not change significantly with treatment although this may reflect low statistical power. The sensitivity and specificity of SDMA and creatinine for the detection of concurrent CKD in hyperthyroid cats were similar in this small study.



Thursday 4 April  
Bolton Room

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# Hepatology & gastroenterology

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- 430 11:05–11:20  
**Magnetic resonance imaging of the brain in dogs with portal vein hypoplasia**  
Chloe Smith
- 430 11:20–11:35  
**Breed, age and gender distribution of canine hepatobiliary disease in the United Kingdom**  
Yuvani Bandara
- 431 11:35–11:50  
**Evaluation of preprandial and two-hour postprandial serum bile acid concentrations in referral population of dogs**  
Veronica Gonzalo Nadal
- 431 11:50–12:05  
**Assessment of visceral pain and quality of life in dogs with chronic enteropathy – A controlled questionnaire based pilot study**  
Jorge Pérez-Accino
- 432 12:05–12:20  
**Combined endoscopic and fluoroscopic assisted balloon dilation as a treatment method for benign oesophageal strictures in dogs**  
Marianne Pilot
- 432 12:20–12:35  
**Indications for administration of gastroprotectant medications in hospitalised dogs and cats**  
Rachel McCormack
- 433 12:35–12:50  
**Does sedation increase the frequency of radiographic oesophageal dilation in dogs without signs of clinical oesophageal disease?**  
Giulia Marceglia

## Oral presentations

# Magnetic resonance imaging of the brain in dogs with portal vein hypoplasia

Chloe Smith<sup>1</sup>, Vicki Black<sup>1</sup>, Kate Bradley<sup>1</sup>, Michael. S Tivers<sup>2</sup>

1 Langford Veterinary Services, Bristol, United Kingdom

2 Langford Veter, Bristol, United Kingdom

## OBJECTIVES

To determine if there are T1-weighted signal hyperintensities in the lentiform nucleus on magnetic resonance imaging (MRI) of dogs with portal vein hypoplasia, suggestive of hepatic encephalopathy.

## METHODS

The medical records from 2014 to 2018 were retrospectively reviewed for dogs diagnosed with portal vein

hypoplasia on histopathology, with no macroscopic shunt. Dogs were included if they had also had a brain MRI scan performed. Control dogs with a diagnosis of idiopathic epilepsy that had a brain MRI scan were age and breed matched. T1-weighted MRI signal intensity of the lentiform nucleus was quantified by a blinded observer, using a previously described technique. The mean lentiform nucleus index was compared between groups with an independent samples T-test.

## RESULTS

In total 6 portal vein hypoplasia and 6 control dogs were identified. The mean lentiform nucleus index for portal vein hypoplasia dogs was 0.925 (standard deviation  $\pm$  0.084) and for control dogs was 0.902 (standard deviation  $\pm$  0.060). This difference was not statistically significant ( $p = 0.601$ ).

## STATEMENT (CONCLUSIONS)

This study did not find evidence of lentiform nucleus changes on MRI as previously described in dogs with congenital portosystemic shunts. Portal vein hypoplasia may not result in hepatic encephalopathy, or alternatively this may be less severe than in dogs with macroscopic shunts, however larger studies are required to further establish this.

# Breed, age and gender distribution of canine hepatobiliary disease in the United Kingdom

Yuvani Bandara<sup>1</sup>, William A Bayton<sup>1</sup>, Nick Bexfield<sup>1</sup>, Tim Scase<sup>2</sup>

1 University of Cambridge, Cambridge, United Kingdom

2 Bridge Pathology, Bristol, United Kingdom

## OBJECTIVES

Canine hepatobiliary disease is common. However, data determining disease prevalence and breed, age and gender predispositions of affected dogs in the UK is lacking. The primary objective was to identify the frequency of canine hepatobiliary disease in a UK population of dogs and consequently determine breeds at increased risk of hepatobiliary disease based on age and gender.

## METHODS

Histopathology reports from canine liver tissues submitted to a commercial laboratory between December 2012

and February 2018 were retrospectively evaluated. Each diagnosis was categorised according to World Small Animal Veterinary Association standards, and recorded along with breed, age and gender. Cases with incomplete data or no definitive diagnosis were excluded. Breed predisposition was calculated by odds ratios and 95% confidence intervals against a UK-based control population of microchipped dogs.

## RESULTS

In total 5663 canine liver samples were assessed with 271 excluded. The most frequent histologic diagnoses were reactive hepatitis ( $n = 901$ ), chronic hepatitis ( $n = 856$ ); reversible hepatocellular injury ( $n = 718$ ); hepatocellular neoplasia ( $n = 660$ ); disorders of impaired hepatic perfusion ( $n = 439$ ); nodular hyperplasia ( $n = 428$ ); gall bladder disease ( $n = 314$ ); metastatic neoplasia ( $n = 181$ ); neutrophilic cholangitis ( $n = 168$ ) and hepatocellular death ( $n = 132$ ). Breed, age and gender predispositions were calculated within several of these categories.

## STATEMENT (CONCLUSIONS)

This is the first study to document the histopathological frequency of hepatobiliary diseases in a large cohort of dogs in the UK, as well as novel breed, age and gender predispositions. This data may help increase the index of suspicion of a particular disease in the absence of a biopsy-confirmed diagnosis.

# Evaluation of preprandial and two-hour postprandial serum bile acid concentrations in referral population of dogs

**Veronica Gonzalo Nadal, Rodolfo Cappello, Alenka Hrovat**

North Downs Specialist Referrals, Bletchingley, United Kingdom

## OBJECTIVES

To examine preprandial (PreSBA) and postprandial serum bile acid (PostSBA) concentrations in dogs referred for a work up of neurological, hepatobiliary disease and portosystemic shunts (PSS).

## METHODS

All dogs with measured PreSBA and PostSBA concentrations were included retrospectively from 2014–2017. Dogs with increased bilirubin and incomplete BA test

results were excluded. Dogs were divided into four groups based on the final diagnose, i.e. neurological, hepatobiliary disease, PSS and other.

## RESULTS

182 dogs met the inclusion criteria. Primary neurological disease was diagnosed in 48/182 dogs. Idiopathic epilepsy was established in 29 and intracranial or spinal disease in 19 dogs with median PostSBA 3.4 (range, 0.8–31.8  $\mu\text{mol/L}$ ) and 12.1 (range, 0.2–60.5  $\mu\text{mol/L}$ ), respectively. Hepatobiliary disease was diagnosed in 32/182 dogs with PostSBA 19.2 (range, 0.1–147.5  $\mu\text{mol/L}$ ). PSS was diagnosed in 21/182 dogs with PostBA 140.2 (range, 43.5–283.3  $\mu\text{mol/L}$ ). 81 dogs presented with conditions other than hepatobiliary and neurological disease with median PostSBA 4.3 (range, 0.1–61.6  $\mu\text{mol/L}$ ). PreSBA and PostSBA concentrations in dogs with PSS were significantly higher ( $p < 0.01$ ) than in dogs with primary neurological and hepatobiliary diseases. PreSBA and PostSBA concentrations in 19/21 dogs with PSS exceeded 75  $\mu\text{mol/L}$ . All dogs with primary neurological disease and idiopathic epilepsy had PreSBA and PostSBA concentrations below 75  $\mu\text{mol/L}$ .

## STATEMENT (CONCLUSIONS)

Bile acid concentrations in dogs with neurological and hepatobiliary disorders are significantly lower than in dogs with PSS. Based on results of this study PSS is unlikely in dogs with PreSBA and PostSBA concentrations below 75  $\mu\text{mol/L}$ .

# Assessment of visceral pain and quality of life in dogs with chronic enteropathy – A controlled questionnaire based pilot study

**Jorge Pérez-Accino, Amy Miele, Silke Salavati**

Royal (Dick) School of Veterinary Studies, Roslin, United Kingdom

## OBJECTIVES

Assessing visceral pain in dogs diagnosed with chronic enteropathy (CE) and its relation to quality of life (QOL).

## METHODS

Institutional veterinary and human ethic committees approved the study. Adult dogs presenting with chronic gastrointestinal (GI) signs to a referral hospital ( $n = 28$ )

were prospectively enrolled and received a standard diagnostic work-up; 18/28 were diagnosed with CE and 10/28 with suspected CE, lacking histopathology. A modified Canine Brief Pain Inventory® (mCBPI) questionnaire was completed by the owners and a visceral pain score (modified Colorado State University Canine Chronic Pain Scale, mCSUCCPS) completed by a veterinarian. A group of control dogs ( $n = 22$ ) was scored as well. Mann-Whitney U test was used to assess differences in scores between cases and controls. Spearman's rank correlation was determined for specific parameters. Significance was set at  $p < 0.05$ .

## RESULTS

The mCBPI and mCSUCCPS scores were significantly higher in dogs with CE compared to controls ( $p = 0.0001$ ,  $p = 0.0008$  respectively): 15/28 CE dogs (54%) were perceived to have fair to poor QOL. There was a strong negative correlation between owner perceived pain and QOL ( $r = -0.81$ ,  $p < 0.05$ ). No significant correlation was found between prying position frequency and mCBPI ( $r = 0.31$ ,  $p = 0.09$ ) or between mCBPI and mCSUCCPS ( $r = 0.30$ ,  $p = 0.11$ ).

## STATEMENT (CONCLUSIONS)

Visceral pain is an important feature of canine CE, which might not readily detected on physical examination.

# Oral presentations

It significantly impacts on owner's perception of QOL. This could lead to reduced treatment compliance or

euthanasia of patients. Assessment and potential treatment of visceral pain in canine CE demands further study.

## Combined endoscopic and fluoroscopic assisted balloon dilation as a treatment method for benign oesophageal strictures in dogs

**Mariette Pilot, Jen O'Keeffe, Gerard Mclauchlan**

Fitzpatrick Referral Oncology & Soft Tissue, Guildford, United Kingdom

### OBJECTIVES

To assess the effectiveness of combined endoscopic and fluoroscopic assisted balloon dilation in dogs with benign oesophageal strictures.

### METHODS

A retrospective study was performed in dogs that underwent combined endoscopic and fluoroscopic assisted

balloon dilation for benign oesophageal strictures. Cases were assigned a Modified Dysphagia Score (MDS) at presentation based on previously published literature (MDS = 0 if no dysphagia present with normal diet; MDS = 1 if able to swallow some solid food; MDS = 2 if able to swallow semi-solid food; MDS = 3 if able to swallow liquids only; MDS = 4 if unable to swallow liquids).

Information recorded included the location and number of strictures, duration of clinical signs, fluoroscopic confirmation of full stricture dilation, number of balloon dilations performed and final MDS score. Cases were excluded if assigning a MDS (either pre or post procedure) was not possible due to lack of information in the medical record.

### RESULTS

Five dogs were included in the study. One patient had undergone 4 endoscopic balloon dilations prior to referral. Combined endoscopic and fluoroscopic dilatation was well tolerated in all cases with no complications reported. Patients underwent an average of 2 dilation procedures and all patients were discharged within 24 hours of treatment. The MDS improved in 4/5 cases and remained static in the remaining case. The mean pre treatment MDS was 2 and mean post-treatment MDS was 0.4.

### STATEMENT (CONCLUSIONS)

Combined endoscopic and fluoroscopic assisted balloon dilation appears an effective method of treating benign oesophageal strictures in dogs.

## Indications for administration of gastroprotectant medications in hospitalised dogs and cats

**Rachel McCormack<sup>1</sup>, James Swann<sup>2</sup>, Barbara Glanemann<sup>2</sup>**

- 1 Queen Mother Hospital for Small Animals, Royal Veterinary College, University of London, North Mymms, United Kingdom
- 2 Dep. of CSS, Royal Veterinary College, University of London, North Mymms, United Kingdom

### OBJECTIVES

To establish how frequently gastroprotectant medications are administered in a specialist veterinary hospital and the stated indications for their use.

### METHODS

A prospective, nurse-led survey was performed over a period of 9 weeks, including all dogs and cats referred to a specialist internal medicine clinic that were hospitalised for more than 24 hours. The use and dosages of gastroprotectant drugs were recorded; attending clinicians completed a questionnaire to establish indications for their use.

### RESULTS

Of 189 dogs and 58 cats hospitalised for more than 24 hours, 74 (39%) dogs and 24 (41%) cats received gastroprotectant drugs. Omeprazole was the drug administered most frequently in 50 dogs and 8 cats, all at a dose

of 1 mg/kg twice daily. Among dogs, major stated indications included vomiting (44%), decreased appetite (20%), regurgitation (14%), gastrointestinal ulceration (10%), pancreatitis (8%), administration of glucocorticoids (8%), azotaemia (6%), haemorrhagic gastroenteritis (4%), and hepatic disease (4%).

Ondansetron was prescribed at 1–2 mg/kg/day in 20 dogs and 1 cat. Among dogs, the major indications were nausea (55%), vomiting (35%), decreased appetite (25%), and pancreatitis (10%).

Maropitant was prescribed at a dose of 1 mg/kg/day in 37 dogs and 8 cats. Indications in dogs included

vomiting (46%), nausea (32%), decreased appetite (30%), whereas the major indication in cats was decreased appetite (50%).

## STATEMENT (CONCLUSIONS)

There was considerable variation in the rationale for administration of gastroprotectant drugs, with no uniform pattern of prescribing. These results will inform development of guidelines for use of these drugs in veterinary practice.

# Does sedation increase the frequency of radiographic oesophageal dilation in dogs without signs of clinical oesophageal disease?

**Giulia Marceglia, Alix McBrearty,  
Gawain Hammond**

University of Glasgow, Glasgow, United Kingdom

## OBJECTIVES

Sedatives are thought to cause artefactual oesophageal dilation in dogs and therefore to assess for oesophageal disease, conscious thoracic radiography is recommended. Evidence to support this recommendation is limited. The aim was to compare the frequency of radiographic oesophageal dilation in dogs without clinical evidence of oesophageal disease when radiographed either with, or without sedation.

## METHODS

Dogs undergoing thoracic radiography between 20/12/17 and 19/9/18 and without vomiting/regurgitation

in the previous 30 days were eligible. Cases radiographed under anaesthesia, with oesophagostomy tubes or oesophageal foreign bodies were excluded. Sedative/opioids administered were recorded. Radiographs were blindly reviewed for oesophageal dilation. If dilated, maximum oesophageal diameters (mm) were measured and the ratio of this to thoracic inlet diameter was calculated (mm).

## RESULTS

298 dogs were included; 108 dogs were conscious, 42 had butorphanol alone, 92 butorphanol and medetomidine and 56 other opioids and/or sedatives. The proportion of dogs with oesophageal dilation was similar in all groups (29.6%, 33.3%, 23.9% and 26.8%, respectively). Median maximum oesophageal diameters were 10.7 mm (range: 3–28.6), 8.4 mm (range: 2.8–20.9), 10.1 mm (range: 1.6–23.9) and 16.4 mm (range: 3.3–40.1) respectively, and median ratios of maximum oesophageal diameter to thoracic inlet diameters were 0.17 (range: 0.04–0.34), 0.11 (range: 0.04–0.28), 0.14 (range: 0.03–0.34) and 0.18 (range: 0.06–0.35) respectively.

## STATEMENT (CONCLUSIONS)

Conscious animals without signs of oesophageal disease may have radiographic oesophageal dilation. Sedated dogs were no more likely to have oesophageal dilation than conscious dogs, nor was it more severe. Based on this study, there is no evidence that sedation increases the risk of radiographic oesophageal dilation.



Thursday 4 April  
Bolton Room

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# Endocrinology

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- 436 14:05–14:20  
**Evaluating the renal ultrastructure in cats with diabetes mellitus**  
Holly Reyes-Hughes
- 436 14:20–14:35  
**The value of serum cortisol as a prognostic indicator in critically ill dogs**  
Harry Swales
- 437 14:35–14:50  
**Diagnosis and management of hyperadrenocorticism in dogs attending UK primary-care practice**  
Imogen Schofield
- 437 14:50–15:05  
**The Cushing's clinical score: Development of a primary-care practice tool to quantify the clinical signs of dogs with hyperadrenocorticism**  
Imogen Schofield
- 438 15:05–15:20  
**Breed influence on canine thyroid reference intervals and age-related thyroid decline**  
Olivia Barnard-Jones
- 438 15:20–15:35  
**Factors influencing thyroid function and deiodinase indices**  
Emma Campbell

## Oral presentations

# Evaluating the renal ultrastructure in cats with diabetes mellitus

Holly Reyes-Hughes<sup>1</sup>, Chris Neal<sup>2</sup>,  
Natalie Finch<sup>2</sup>

1 Bristol Veterinary School, Bristol, United Kingdom

2 Bristol Renal, Bristol, United Kingdom

## OBJECTIVES

The study objectives were to be the first study to report the ultrastructural changes in the kidneys of diabetic cats compared to control cats and to evaluate whether evidence exists for the development of diabetic nephropathy in cats.

## METHODS

Formalin-fixed kidney tissue was collected from three diabetic and five control cats undergoing post-mortem examination. Samples were processed prior to imaging with a transmission electron microscope. Glomerular micrographs were analysed by a blinded investigator

using image analysis software. The following measurements were recorded; glomerular endothelial cell (GEnC) fenestration density and width, podocyte filtration slit density and width, foot process width and glomerular basement membrane (GBM) width and compared between diabetic and control cats using the Mann-Whitney U test.

## RESULTS

For diabetic and control cats respectively: GEnC fenestration density was 5.7 (3.8–7.5) and 5.8 (5.0–6.8)  $\mu\text{m}^{-1}$ , GEnC fenestration width was 86 (76–143) and 83 (73–97) nm; filtration slit density was 4.4 (3.1–5.9) and 4.4 (3.8–5.6)  $\mu\text{m}^{-1}$ , foot process width was 341 (263–532) and 383 (338–484) nm, filtration slit width 38 (31–47) and 34 (29–45) nm, GBM width was 377 (260–475) and 247.9 (127–405) nm. Only GBM width was significantly increased in diabetic compared to control cats ( $P = 0.012$ ).

## STATEMENT (CONCLUSIONS)

This is the first study to report the renal ultrastructural changes in cats with diabetes. The GBM width was significantly increased in diabetic cats suggesting evidence for the development of diabetic nephropathy. The study is limited by the small number of cats included and larger studies are warranted.

Study funded by a PetSavers student research grant.

# The value of serum cortisol as a prognostic indicator in critically ill dogs

Harry Swales, Daniel Batchelor,  
Erin O'Connell

University of Liverpool Small Animal Teaching Hospital, Liverpool, United Kingdom

## OBJECTIVES

Studies in humans with septic shock have demonstrated an inverse correlation between serum cortisol (SC) concentrations and survival whereas veterinary studies have yielded conflicting results. The aim of this retrospective study was to investigate the prognostic value of SC in a referral-centre intensive care unit (ICU) population as well as the influence of sepsis on this association.

## METHODS

Retrospective study of critically ill dogs admitted to the University of Liverpool Small Animal Teaching Hospital ICU between January 2010 and May 2018 that had SC measured within three days of admission. The predictive value of SC was investigated. The current human definition of sepsis was used.

## RESULTS

229 patients met the inclusion criteria and the mortality rate was 20%. SC concentrations were significantly higher in non-survivors (234 nmol/L) than survivors (123 nmol/L) ( $P < .001$ ). SC demonstrated good predictive value for non-survival with an area under the curve of 0.72 (CI 0.64–0.80). An optimum cut-off of 210 nmol/L was calculated corresponding to an OR of 5.4 (CI 2.7–10.9) for non-survival with a sensitivity and specificity of 58% and 80% respectively. SC levels were higher in septic patients (253 nmol/L) than non-septic patients (124 nmol/L) ( $P < .001$ ) but was not predictive of survival ( $P = 0.15$ ).

## STATEMENT (CONCLUSIONS)

Serum cortisol may be used as part of the overall assessment of a critically-ill dog's prognosis.



# Diagnosis and management of hyperadrenocorticism in dogs attending UK primary-care practice

**Imogen Schofield<sup>1</sup>, David Brodbelt<sup>1</sup>,  
Stijn Niessen<sup>1</sup>, Anna Wilson<sup>2</sup>, Dan O'Neill<sup>1</sup>**

<sup>1</sup> Royal Veterinary College, London, United Kingdom

<sup>2</sup> University of Cambridge, Cambridge, United Kingdom

## OBJECTIVES

To describe the diagnosis and management of hyperadrenocorticism in dogs attending primary-care practice in the UK.

## METHODS

The VetCompass database contains electronic patient records for dogs attending UK primary-care practices. The records of dogs diagnosed with hyperadrenocorticism were reviewed and additional diagnostic and management data were extracted including: diagnostic testing, treatment, trilostane dose and monitoring cortisol measurements.

## RESULTS

The study identified 219 dogs diagnosed with hyperadrenocorticism. The most commonly used diagnostic tests were the ACTH stimulation test ( $n = 206$  cases, 94.1%), low-dose dexamethasone suppression test (70, 32.0%) and urine cortisol-creatinine ratio (58, 26.5%). Differentiation between pituitary- and adrenal-dependent aetiology was performed in 44 cases (20.1%). Trilostane was given in 206 cases (94.1%) with a mean starting dose of 3.30 mg/kg/day (SD 1.28). Ninety-four cases (45.6%) had no changes made to their initial trilostane dose. Of dogs with cortisol concentrations recorded after initiation of therapy, post-ACTH stimulation cortisol did not drop below the upper reference range of 250 nmol/L in any test in 32 (32.0%) and results fell below the lower reference range of 40 nmol/L in 21 (21.0%). Iatrogenic hypoadrenocorticism or a suspected adverse response was recorded in 28 (13.6%) dogs receiving trilostane.

## STATEMENT (CONCLUSIONS)

This study provides benchmark data describing the diagnosis and management of hyperadrenocorticism in primary-care practice. Findings show the ACTH stimulation test predominates in diagnosis and differentiation between pituitary and adrenal disease is infrequently performed, contrary to current expert recommendations. Further work evaluating the benefits of disease differentiation and survival after treatment in a primary-care setting is merited.

# The Cushing's clinical score: development of a primary-care practice tool to quantify the clinical signs of dogs with hyperadrenocorticism

**Imogen Schofield, Dan O'Neill,  
David Brodbelt, Stijn Niessen**

Royal Veterinary College, London, United Kingdom

## OBJECTIVES

With doubts raised over the accuracy of hormonal testing of hyperadrenocorticism, monitoring recommendations for dogs undergoing trilostane treatment emphasise

the importance of clinical sign assessment. This study aimed to produce a tool to enable standardised quantification of the clinical signs associated with hyperadrenocorticism in primary-care practice.

## METHODS

Structured focus groups were held with 19 clinicians and 13 owners of dogs with hyperadrenocorticism, 21 veterinary publications were reviewed and 20 randomly selected electronic health records of hyperadrenocorticism cases were analysed to identify potential clinical signs associated with hyperadrenocorticism. Qualitative thematic analysis identified five categories of clinical signs. A scoring system was designed based on the severity of clinical signs in each category ranging from 0–3, producing a score out of 15 (higher score indicate more clinical hyperadrenocorticism). The tool was piloted with 16 owners and 12 clinicians to assess its readability and clarity.

## RESULTS

A list of 24 clinical signs associated with hyperadrenocorticism was drafted. Qualitative thematic analysis identified polydipsia and polyphagia as the most commonly

# Oral presentations

discussed clinical signs in the focus groups, with changes in demeanor and lethargy more frequently mentioned by owners than clinicians. Clinical signs were summarised into five categories: drinking, urination, appetite, appearance and attitude/activity. Clinicians and owners reported the tool to be clear, concise and practical for a primary-care setting.

## STATEMENT (CONCLUSIONS)

The developed tool standardises the recording of clinical signs of hyperadrenocorticism and could be used in practice to assess medical management of hyperadrenocorticism. Further validation is planned through correlation with biological parameters and patient outcomes.

## Breed influence on canine thyroid reference intervals and age-related thyroid decline

**Olivia Barnard-Jones<sup>1</sup>, Kent Refsal<sup>2</sup>, Peter Graham<sup>1</sup>**

1 University of Nottingham, Sutton Bonington, United Kingdom  
2 Michigan State University, East Lansing, USA

### OBJECTIVES

Hypothyroidism is a common canine condition which can be difficult to diagnose. Misdiagnosis can result in unnecessary life-long treatment. One complicating factor may be variation in thyroid hormone reference intervals between breeds, previously shown to be diagnostically important in sighthounds. Increasing age is associated with decreasing thyroxine and increasing TSH serum concentrations, but breed influence on this effect has not previously been explored.

This projects aimed to investigate whether more, non-sighthound, breed-specific reference intervals

would be appropriate and to discover whether breed influenced age-related thyroid changes.

### METHODS

The study explored total and free, thyroxine and 3-5-3'-triiodothyronine (TT4, FT4, TT3, FT3), and thyrotropin (TSH) in 81,985 euthyroid dogs from 214 breeds using a database of serum thyroid profile results. Breed reference intervals (2.5 to 97.5 percentile) were created for 77 breeds with more than 140 cases.

### RESULTS

Breed-specific reference limits differed; the lower limit for TT4 ranged from 7 (Sharpei) to 17 nmol/L (Cavalier King Charles Spaniel; CKCS) and the upper TSH limit from 0.44 (Soft Coated Wheaten Terrier) to 0.63 ng/ml (Keeshond). There was a breed effect on age-related thyroid hormone decline and TSH increase. TT4 decline ranged from -0.021 (Basenji) to -1.324 (CKCS) nmol/L/yr. TSH increase ranged from 0.00097 (Bulmastiff) to 0.0137 (CKCS) ng/ml/yr.

## STATEMENT (CONCLUSIONS)

Breeds other than the sighthound group would benefit from their own breed-specific thyroid reference intervals, such as CKCS, as they differed significantly from all-breed intervals with a consequent risk of misdiagnosis. Some breeds also have quicker "thyroid-axis-ageing" than others.

## Factors influencing thyroid function and deiodinase indices

**Emma Campbell<sup>1</sup>, Kent Refsal<sup>2</sup>, Peter Graham<sup>1</sup>**

1 University of Nottingham, Sutton Bonington, United Kingdom  
2 Michigan State University, East Lansing, USA

### OBJECTIVES

Age, breed, gender and obesity have been shown to influence thyroid function and concentrations of thyroid hormones in the dog. This study investigated whether these factors, breed size and geographical location

(climate) influenced deiodinase activity (tri-iodothyronine (T3): thyroxine (T4) ratio) and thyroid functional 'set-point' (T4:Thyrotropin (TSH) ratio).

### METHODS

Analysis of a USA database of canine laboratory thyroid function assessments (n > 70,000 euthyroid cases). Regression was used to assess associations between numerical values and Kruskal-Wallis to compare differences between categories.

### RESULTS

Age was associated with an increased deiodinase activity (P < 0.05) and lower thyroid functional 'set-point' (P < 0.001). 'Set-point' was affected by breed (P < 0.001) and T4:TSH ratio was lower in overweight dogs (P < 0.05). Overweight was associated with higher T3, T4 and TSH concentrations (p < 0.001) but there was no difference in

deiodinase activity. Gender and neuter status influenced deiodinase activity which was greater in males than in females ( $P < 0.001$ ) and lower in entire than neutered females ( $P < 0.001$ ). Breed size and geographical location (average state temperature) did not affect deiodinase activity or 'set-point' ( $P > 0.05$ ). Higher TSH concentrations were associated with higher de-iodinase activity ( $p < 0.05$ ).

## STATEMENT (CONCLUSIONS)

Deiodinase activity acts as an additional control point for thyroid function and is influenced by age, sex and TSH concentrations. Being overweight is associated with higher thyroid hormones and TSH. 'Set-point' is influenced by age, breed and weight status. These factors may need considering in laboratory definitions of canine hypothyroidism.



Friday 5 April  
Bolton Room

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# Dermatology, other, infectious diseases

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- 442 08:30–08:45  
**Effect of the ingredient A97614A1 on the adhesion and biofilm formation of *Staphylococcus pseudintermedius* in a model of reconstructed canine epidermis**  
Elodie Ollivier
- 442 08:45–09:00  
**Efficacy of the ingredient A97614A1 in a model of reconstructed human epidermis stressed by cytokines**  
Elodie Ollivier
- 443 09:00–09:15  
**Two case reports of novel cutaneous mycoses in cats in the UK using molecular identification for rapid and accurate diagnosis**  
Nikoleta Makri
- 443 09:15–09:30  
**Antimicrobial susceptibility of bacterial isolates from canine wounds in a referral population**  
Catrina Pennington
- 444 09:30–09:45  
**The Antimicrobial Stewardship and Pets (ASAP) project: performance and evaluation of an Antimicrobial Stewardship Improvement Strategy in 44 Dutch companion animal clinics**  
Nonke Hopman
- 445 09:45–10:00  
**Prevalence and trends in antimicrobial resistance of bacteria from canine urinary tract isolates from an Australian referral hospital over a five-year period**  
Madeleine Roberts
- 445 10:00–10:15  
**Patterns of antimicrobial resistance in canine wound infections from two large scale electronic datasets**  
Laura Holloway

## Oral presentations

### Effect of the ingredient A97614A1 on the adhesion and biofilm formation of *Staphylococcus pseudintermedius* in a model of reconstructed canine epidermis

Elodie Ollivier<sup>1</sup>, Claudine Zemirline<sup>1</sup>,  
Laetitia Marchand<sup>2</sup>, Brigitte Closs<sup>2</sup>

1 Ceva Santé Animale, Libourne, France

2 Silab, Brive, France

#### OBJECTIVES

Dogs with atopic dermatitis present a loss of diversity of their skin microbiota with relative increases in *Staphylococcus* spp. abundances during flares. There is a strong correlation between this dysbiosis, inflammation and skin barrier defect. *Staphylococcus pseudintermedius* is also the most frequent pathogen isolated from skin and ear infections in dogs. The objective of this study was to

evaluate the efficacy of the ingredient coded A97614A1 on the adhesion and biofilm formation of *Staphylococcus pseudintermedius* in a model of Reconstructed Canine Epidermis (RCE).

#### METHODS

Primary keratinocytes extracted from skin samples of two dogs were cultured in a specific medium for 12 days in order to develop RCEs. On day 12, RCEs were either treated topically with A97614A1 during 24 hours or not treated (controls). On day 13, 50 µL of a 106 CFU/mL suspension of *Staphylococcus pseudintermedius* isolated from a dog with pyoderma were topically applied on RCEs. Twenty-four hours later (day 14), RCEs were observed using scanning electron microscopy to assess the adhesion and biofilm formation of *Staphylococcus pseudintermedius*.

#### RESULTS

RCEs treated with A97614A1 presented much less *Staphylococcus pseudintermedius* than control RCEs. The ingredient A97614A1 therefore limited the adhesion and biofilm formation of *Staphylococcus pseudintermedius* at the surface of the RCEs.

#### STATEMENT (CONCLUSIONS)

These results support the potential interest of incorporating this ingredient into topical products intended for dogs presenting an alteration of their skin microbiota, including atopic dogs.

### Efficacy of the ingredient A97614A1 in a model of reconstructed human epidermis stressed by cytokines

Elodie Ollivier<sup>1</sup>, Claudine Zemirline<sup>1</sup>,  
Nicolas Amalric<sup>2</sup>, Valérie Rahoul<sup>2</sup>, Nadège  
Reymond<sup>3</sup>, Marie-Christine Cadiergues<sup>4</sup>

1 Ceva Santé Animale, Libourne, France

2 Synelvia, Labège, France

3 Consultant, Villeneuve Loubet, France

4 UDEAR, Université de Toulouse, INSERM, ENVT, Toulouse, France

#### OBJECTIVES

In dogs and cats as in humans, dermatological disorders are associated with impaired skin barrier, comprising a defective mechanical barrier, a dysregulation of the

immune response and an alteration of the skin microbiota. The objective of this study was to evaluate the efficacy of a new ingredient coded A97614A1 on the mechanical and immunological skin barrier, using an *in-vitro* model of Reconstructed Human Epidermis (RHE) stressed by cytokines to induce a skin barrier defect.

#### METHODS

RHE stressed by cytokines were treated with A97614A1 and compared to non-treated stressed RHE and to normal (not stressed and non-treated) RHE. The evaluation of the effect of A97614A1 on the mechanical skin barrier (including hydration) was assessed through the analysis of RHE morphology, outside-inside permeability (Lucifer yellow test), transepidermal water loss (TEWL), Natural Moisturising Factors (NMFs) and ceramides. The analysis of the pro-inflammatory cytokines IL-8 and TSLP (markers of the immune response) served as criteria to evaluate the immunological skin barrier.

#### RESULTS

Compared to normal RHE, stressed RHE present a disorganisation of the structure (dissociation of cells, spongiosis, fewer and smaller keratohyaline granules), increased permeability and TEWL, and decreased amount of NMFs

and ceramides; the IL-8 and TSLP release is increased. Treatment with A97614A1 allowed stressed RHE to recover normal morphology, impermeability, TEWL, IL-8 and TSLP amounts, and close to normal amounts of NMFs and ceramides.

## STATEMENT (CONCLUSIONS)

The ingredient A97614A1 was shown to have beneficial effects on the mechanical and immunological skin barrier. These results support the potential interest of incorporating it into topical products.

# Two case reports of novel cutaneous mycoses in cats in the UK using molecular identification for rapid and accurate diagnosis

**Nikoleta Makri<sup>1</sup>, Gavin Paterson<sup>2</sup>,  
Fiona Gregge<sup>3</sup>, Catriona Urquhart<sup>4</sup>,  
Holly McCluskey<sup>5</sup>, Tim Nuttall<sup>1</sup>**

- 1 Hospital for Small Animals, Royal (Dick) School of Veterinary Studies, Edinburgh, United Kingdom
- 2 Easter Bush Pathology, Royal (Dick) School of Veterinary Studies, Edinburgh, United Kingdom
- 3 Aberdeen PDSA Pet Hospital, Aberdeen, United Kingdom
- 4 Abervet, Aberdeen, United Kingdom
- 5 Riverside Veterinary Practice, Livingston, United Kingdom

## OBJECTIVES

Phaeohyphomycosis and sporotrichosis are saprophytic mycoses affecting humans and animals. Traumatic inoculation results in cutaneous and subcutaneous lesions that can be locally invasive. Traditional culture based methods can be slow and may not sufficiently classify the fungi. Molecular testing however, can achieve a fast definitive identification.

## METHODS

Two cats (cat 1–15-year-old male neutered domestic short hair; cat 2–11-year-old female neutered domestic long hair) developed focal suppurative nodular lesions on the dorsal nose. Both cats had been previously diagnosed with diabetes mellitus and were on insulin therapy. There was no response to broad spectrum antibiotics selected following antimicrobial susceptibility tests. Fungal elements were seen on cytology, although initial culture was negative in cat 2. Subsequent isolates were obtained after overnight incubation of fresh discharge on Sabouraud dextrose agar with chloramphenicol. These were submitted for PCR and sequencing of the ribosomal internal transcribed spacers (ITS) with the primers ITS-F and ITS-R.

## RESULTS

PCR and sequencing confirmed phaeohyphomycosis with *Exophiala dermatitidis* (cat 1) and sporotrichosis with *Sporothrix pallida* complex (cat 2). Further sequencing of calmodulin and beta-tubulin partial gene sequences confirmed *Sporothrix humicola*.

## STATEMENT (CONCLUSIONS)

These are the first reports of *Exophiala dermatitidis* and *Sporothrix humicola* in cats in the UK. The use of molecular methods provided a rapid and definite identification of the fungi. Clinicians and pathologists need to be aware of the emerging use of molecular techniques to achieve rapid and accurate identification of rare fungal microorganisms. This will help reduce unnecessary antibiotic use.

# Antimicrobial susceptibility of bacterial isolates from canine wounds in a referral population

**Catrina Pennington<sup>1</sup>, Tim Nuttall<sup>2</sup>,  
Jon Hall<sup>3</sup>**

- 1 University of Edinburgh, Edinburgh, United Kingdom
- 2 University of Edinburgh, Edinburgh, United Kingdom
- 3 University of Edinburgh, Edinburgh, United Kingdom

## OBJECTIVES

To report the prevalence and antimicrobial susceptibility of bacteria isolated from canine wounds in a referral population.

## METHODS

Data was collected from clinical records of dogs with wounds cultured between 01/01/2008 and 01/01/2018. Cases with incomplete clinical information or results were excluded. 1 isolate was included where the same bacteria were isolated from multiple samples in a dog.

## RESULTS

392 cases (499 samples) were included. 83.5% of cultures were positive; 54.7% isolated a single organism and 28.8% two or more.

# Oral presentations

45.8% of the positive cultures comprised gram-positive isolates only, 31.6% gram-negative only, 15.7% gram-positive and gram-negative, and 3.9% included obligate anaerobic organisms. Other cultures involved unidentified isolates.

The most frequent isolates were: *Staphylococcus pseudintermedius* (27.8%), *E. coli* (18.3%), *Staphylococcus aureus* (6.5%), *Pseudomonas aeruginosa* (5.9%) and *Pasteurella multocida* (4.9%).

Meticillin-resistance (MecA) was detected in 19.5% of the *Staphylococcus* isolates. AmpC and/or ESBL (extended spectrum beta-lactamase) expression was detected in 19.8% of *E. coli*, *Klebsiella* and *Enterobacter* isolates.

Antimicrobial susceptibility of the *S. pseudintermedius* at first culture was 81.3% (cephalexin), 76.7% (enrofloxacin),

68.7% (clavulanate-amoxicillin), 68% (TMPS), 68% (clindamycin), 33.3% (amoxicillin) and 29.2% (erythromycin). For *E. coli* it was 91.3% (gentamicin), 75% (enrofloxacin), 64% (TMPS), 52.7% (doxycycline), 49.4% (clavulanate-amoxicillin) and 44% (cefalexin).

No clear pattern was detected in antimicrobial susceptibility, although the prevalence AmpC/ESBL expression has increased.

## STATEMENT (CONCLUSIONS)

Knowledge of common wound pathogens and their antimicrobial susceptibility will aid appropriate drug selection. This is key to antimicrobial stewardship.

# The Antimicrobial Stewardship and Pets (ASAP) project: performance and evaluation of an Antimicrobial Stewardship Improvement Strategy in 44 Dutch companion animal clinics

**Nonke Hopman<sup>1</sup>, Lützen Portengen<sup>1</sup>,  
Marlies Hulscher<sup>2</sup>, Dick Heederik<sup>1</sup>,  
Jaap Wagenaar<sup>1</sup>, Ingeborg van Geijlswijk<sup>1</sup>,  
Els Broens<sup>1</sup>**

<sup>1</sup> Faculty of Veterinary Medicine, Utrecht, Netherlands

<sup>2</sup> Radboud University Medical Center, IQ healthcare, Nijmegen, Netherlands

## OBJECTIVES

To evaluate an Antimicrobial Stewardship Programme (ASP) designed to promote responsible antimicrobial use (AMU) in companion animal clinics. This will contribute

to containing the further development and spread of antimicrobial resistance in companion animals.

## METHODS

An ASP was developed based upon an interview and a survey study among companion animal veterinarians. The effect of the ASP on AMU was assessed in 44 Dutch companion animal clinics over a three year period, between 2016–2018, using a stepped-wedge design. This multifaceted intervention consisted of post-educational training, an information leaflet for pet owners and clinic specific feedback on AMU.

Monthly information on AMU, differentiated in first, second and third choice antimicrobials (based upon Dutch policy on veterinary AMU) was collected from the Practice Management Systems before and after the intervention. The ASP effect was estimated by meta-analyses of estimated intervention effects for each clinic.

## RESULTS

AMU had already been reduced prior to implementation of the ASP (intervention) in many of the clinics. Using trend extrapolation from auto-regressive models, a further decrease in total, second and third choice AMU could be attributed to the ASP in several clinics, resulting in an overall significant decrease for total and second choice AMU as estimated in the meta-analyses.

Participants reported to be more aware of AMU after participation in the ASP.

## STATEMENT (CONCLUSIONS)

The ASAP project shows that AMU in Dutch companion animal clinics can be optimised by introducing an ASP. More refined data analyses will follow and feasibility of implementation of ASP on a larger scale will be further explored.



# Prevalence and trends in antimicrobial resistance of bacteria from canine urinary tract isolates from an Australian referral hospital over a five-year period

**Maddie Roberts**

Small Animal Specialist Hospital, Sydney, Australia

## OBJECTIVES

To identify the prevalence of bacteria from canine urine tract isolates and to assess for any trends in antimicrobial resistance of the most frequently identified isolate over a five-year period from a referral hospital in Australia.

## METHODS

Retrospective analysis of positive canine urinary bacterial cultures between January 2013 and December 2017

inclusive. Bacteria were classified as sensitive, intermediate or resistant, with intermediate and resistant grouped together as 'non-susceptible'. Resistance of the most prevalent bacteria towards select antimicrobials (when evaluated in over 100 isolates) was examined using Chi squared or Fisher's exact test for low cell frequencies with a p-value of <0.05 of statistical significance.

## RESULTS

A total of 382 positive cultures returned with 412 bacterial isolates. Of these, 27 were polymicrobial ( $\geq 2$ ) cultures. *Escherichia coli* was the most prevalent bacteria (49.5%), followed by *Proteus sp.*, *Staphylococcus sp.*, *Enterococcus sp.*, *Klebsiella sp.*, and *Pseudomonas sp.* respectively (12.3; 12.0; 9.7; 5.0 and 4.2%). Antimicrobials where over 100 *E. coli* isolates were evaluated included amoxicillin-clavulanate, trimethoprim-sulphonamide, amoxicillin, enrofloxacin and doxycycline. When comparing resistance of *E. coli* in 2013 against each year, and 2013 to the final study year there were no statistically significant trends in antimicrobial resistance towards any of the antimicrobials evaluated.

## STATEMENT (CONCLUSIONS)

*E. coli* was the most prevalent bacteria isolated in canine urine samples at our institution, similar to what has been described elsewhere. There were no significant trends in resistance of *E. coli* towards any of the antimicrobials evaluated during our study period.

# Patterns of antimicrobial resistance in canine wound infections from two large scale electronic datasets

**Laura Holloway, Jonathan Massey,  
Fernando Sánchez-Vizcaíno, Tristan Cogan,  
Andrew Dowsey, Michael Tivers**

University of Bristol, Bristol, United Kingdom

## OBJECTIVES

To investigate temporal trends in sensitivity profiles and multi-drug resistance of bacteria cultured from wounds in dogs in the United Kingdom.

## METHODS

Two datasets of culture and sensitivity results from samples taken from wounds in dogs were retrospectively analysed. Dataset 1 (D1) was sourced from a commercial laboratory (2011–18), whilst dataset 2 (D2) was sourced from four laboratories compiled by the Small Animal Veterinary Surveillance Network (SAVSNET) (2010–2017). Statistical analyses were conducted using R language. Temporal trends were analysed following orthogonal polynomial and forward difference coding with either a mixed effects binomial logistic regression model (D1) when data included practice postcode to counteract clustering, or a binomial logistic regression model (D2).

## RESULTS

D1 contained 9302 samples, 5858 of which had specific bacteria isolated, whilst D2 contained 10,024 samples with bacterial species isolated. Significant ( $p < 0.05$ ) temporal observations which correlated across both datasets were seen. There were reductions in both amoxicillin-clavulanic acid (D1 73.3% to 22.2%; D2 54.1% to 23.5%) and marbofloxacin (D1 59.1% to 23.8%; D2 51.4% to 19.7%)

# Oral presentations

resistance in *Staphylococcus aureus* and enrofloxacin and marbofloxacin resistance (both D1 34.7% to 5.8%; D2 18.2% to 1.0%) in *Escherichia coli*. A reduction in multi-drug resistant *Staphylococcus aureus*, defined as resistance to 3 or more antimicrobial categories, was also observed (D1 72.7% to 27.0%; D2 55.5% to 26.4%).

## STATEMENT (CONCLUSIONS)

Significant observations in both datasets suggest a reduction in antimicrobial resistance in organisms recognised as nosocomial pathogens. This may reflect an increased awareness of antimicrobial resistance among practising vets and hence more responsible use of antimicrobials.

Friday 5 April  
Bolton Room

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# Cardiology & respiratory

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- 448 11:05–11:20  
**Rhythm disturbances in dogs and cats with congestive heart failure and their impact on prognosis**  
Felicia Ann Robertson
- 448 11:20–11:35  
**A retrospective study into the association between survival time and markers of renal dysfunction and heart failure severity in dogs with acute congestive heart failure**  
Christopher Ray
- 449 11:35–11:50  
**The effect of heart disease on red cell mass**  
Madeleine Stein
- 449 11:50–12:05  
**A new hope? Transvascular pulmonic stents in six dogs with severe pulmonic stenosis**  
Kieran Borgeat
- 450 12:05–12:20  
**Infiltrative laryngeal disease in 11 dogs**  
Amy Dixon

## Oral presentations

# Rhythm disturbances in dogs and cats with congestive heart failure and their impact on prognosis

Felicia Ann Robertson<sup>1</sup>, Malcolm Cobb<sup>2</sup>

1 The University of Nottingham, School of Veterinary Medicine & Science, Nottingham, United Kingdom

2 The University of Nottingham, School of Veterinary Medicine & Science, Nottingham, United Kingdom

## OBJECTIVES

Do rhythm disturbances in dogs and cats with congestive heart failure contribute to a poorer prognosis?

## METHODS

This study retrospectively reviewed 101 cases of congestive heart failure, 47 dogs and 54 cats and the presence or absence of a concurrent rhythm disturbance at diagnosis was determined. The nature of rhythm disturbance

and the underlying cause for the heart failure were also recorded. The data was analysed using Microsoft excel and SPSS statistics. The median survival time was calculated for animals with and without a rhythm disturbance and Mann-Whitney U and Log-Rank tests were used to evaluate any significant difference in survival time.

## RESULTS

Rhythm disturbances were more prevalent in dogs with congestive heart failure, with 60% having a concurrent rhythm disturbance compared to 46% of cats. Supraventricular dysrhythmias, in particular atrial fibrillation, were most common and accounted for 68% of all rhythm disturbances in dogs, more variation was shown in cats. The median survival time for dogs with a rhythm disturbance was 84 days compared to 203 days for those without, for cats these were 39 and 41 days respectively. In dogs, a significant difference in survival time after diagnosis with congestive heart failure was identified between the two groups ( $U = 150$ ,  $p = 0.017$ /Log-Rank,  $p = 0.030$ ). In cats, no significant difference was detected ( $U = 347$ ,  $p = 0.792$ /Log-Rank,  $p = 0.323$ ).

## STATEMENT (CONCLUSIONS)

This study suggests that rhythm disturbances complicating congestive heart failure contribute to a poorer prognosis in dogs but are less detrimental in cats.

# A retrospective study into the association between survival time and markers of renal dysfunction and heart failure severity in dogs with acute congestive heart failure

Christopher Ray, Joon Seo, Virginia Luis Fuentes

The Royal Veterinary College, London, United Kingdom

## OBJECTIVES

To evaluate markers of renal dysfunction, heart failure severity and treatment versus survival in dogs with acute congestive heart failure.

## METHODS

Retrospective study of dogs admitted with congestive heart failure between October 2006 and February 2018. The effect of disease duration, cause of heart failure, atrial fibrillation, furosemide dose, blood pressure, urea, creatinine, sodium, potassium, lactate, phosphorus, respiratory rate, dobutamine administration, and pimobendan administration on survival from admission were analysed with Kaplan Meier graphs, and log-rank analysis.

## RESULTS

83 dogs met the inclusion criteria (36 female, 47 male). Reduced survival time was associated with chronic disease ( $p = 0.049$ ); blood pressure  $\leq 112.5$  mm Hg ( $p = 0.0002$ ); mean furosemide dose  $> 8$  mg/kg ( $p = 0.043$ ); mean potassium level  $\leq 3.77$  mmol/l ( $p = 0.004$ ); dobutamine administration ( $p = 0.001$ ); and mean respiratory rate  $\leq 48$  ( $p = 0.039$ ). Survival time was increased with plasma urea between 13.1–18.78 mmol/l ( $p = 0.016$ ); mean sodium concentration 145.7–150.25 mmol/l ( $p = 0.027$ ); and mean phosphorus concentration  $\leq 1.79$  mmol/l ( $p = 0.021$ ).

## STATEMENT (CONCLUSIONS)

We found no association between creatinine concentrations and survival, although survival was worse for both low and high urea concentrations. Only higher

furosemide doses were associated with worse survival, identifying worse cases or suggesting a detrimental effect of over-diuresis. Lower blood pressure was also associated with decreased survival, probably because of

lower cardiac output and worse cardiac disease. The relationship between heart failure, renal function and diuresis should be explored prospectively in larger study populations.

## The effect of heart disease on red cell mass

**Madeleine Stein, Jenny Wilshaw,  
Nicola Lotter, Adrian Boswood**

Royal Veterinary College, London, United Kingdom

### OBJECTIVES

This study aims to demonstrate whether a link exists between increasing severity of heart disease and red blood cell count in dogs with Myxomatous mitral valve disease.

### METHODS

Data were obtained from 426 dogs enrolled in a longitudinal study from first opinion practices based in London between 2004 and 2017. PCV was compared between dogs at different American College of Veterinary Internal Medicine (ACVIM) stages of disease and factors related to changes in PCV were evaluated including; age, sex, breed, total protein, blood urea nitrogen, the left atrial

to aortic root ratio and the normalised left ventricular internal diameter (LVIDDN).

### RESULTS

One-way ANOVA showed a significant difference ( $p < 0.001$ ) between all four ACVIM stages. Dogs in stage B2 ( $41.12 \pm 6.15$ ,  $p < 0.001$ ) had a significantly lower PCV than all other stages (A:  $46.14 \pm 4.97$ ,  $p < 0.001$ , B1:  $43.44 \pm 5.80$ ,  $p = 0.012$ , C:  $43.98 \pm 4.57$ ,  $p = 0.048$ ). The results additionally demonstrated that the mean PCV of dogs in stage A was the greatest and differed significantly from both stage B1 ( $p = 0.007$ ) and B2 ( $p < 0.001$ ).

A multivariable linear regression analysis revealed that patient age ( $-0.154 \pm 0.111$ ,  $p = 0.006$ ), ACVIM stage ( $-0.122 \pm 0.496$ ,  $p = 0.40$ ), LVIDDN ( $-0.160 \pm 1.122$ ,  $p = 0.008$ ) and breed ( $0.471 \pm 0.661$ ,  $p = 0.001$ ) all had a significant and independent effect on PCV.

### STATEMENT (CONCLUSIONS)

There is a link between mitral valve disease and red blood cell count in dogs, which differs from human disease. A decrease in red blood cell count is seen with diseased progression until patients enter congestive heart failure when there is an increase.

## A new hope? Transvascular pulmonic stents in six dogs with severe pulmonic stenosis

**Kieran Borgeat<sup>1</sup>, Melanie Hezzell<sup>1</sup>,  
Guillaume Chanoit<sup>1</sup>, Jessie Rose Payne<sup>1</sup>,  
Pedro Oliveira<sup>2</sup>**

<sup>1</sup> Langford Vets, University of Bristol, Bristol, United Kingdom

<sup>2</sup> Davies Veterinary Specialists, Hitchin, United Kingdom

### OBJECTIVES

Dogs with type B (hypoplastic) pulmonic stenosis have been traditionally considered poor candidates for minimally invasive treatment. We report six cases of type B pulmonic stenosis treated using pulmonic stents.

### METHODS

Retrospective description of six dogs with pulmonic stenosis undergoing a transvascular pulmonic stent procedure in two cardiology referral centres, describing the approach and short-term outcomes.

### RESULTS

Six dogs underwent a pulmonic stent procedure over a 12-month period. All dogs were diagnosed with severe, type B pulmonic stenosis based on echocardiographic criteria. Five French Bulldogs and one English Bulldog were treated. Two patients presented with signs of right sided congestive heart failure, two with erythrocytosis (concurrent right-to-left intracardiac shunts), one with syncope and one with marked exercise intolerance/lethargy. Five dogs successfully received balloon-expandable metallic stents via a venous approach. In one dog, the stent could not be positioned appropriately and a hybrid procedure was successfully performed to place the stent retrograde, via the left pulmonary artery. No major complications were reported, although all dogs experienced reduced cardiac output and arrhythmias during stent deployment. All dogs experienced an improvement in clinical signs at one month post-operatively.

## STATEMENT (CONCLUSIONS)

Pulmonic stents represent a new frontier in interventional cardiology to manage dogs with type B pulmonic

stenosis that previously were considered poor candidates for minimally invasive procedures.

## Infiltrative laryngeal disease in 11 dogs

**Amy Dixon<sup>1</sup>, Michael S. Tivers<sup>2</sup>,  
Leo Packham<sup>1</sup>, Vicki Black<sup>1</sup>**

<sup>1</sup> Bristol Vet School, Bristol, United Kingdom

<sup>2</sup> Paragon Veterinary Referrals, Wakefield, United Kingdom

## OBJECTIVES

To describe the clinical features and outcome of infiltrative laryngeal disease in dogs.

## METHODS

Medical records at a single referral centre (2013–2018) were retrospectively reviewed for dogs with infiltrative laryngeal disease diagnosed by cytology and/or histopathology. Referring veterinarians were contacted for follow-up.

## RESULTS

Eleven dogs were included, with a median age of 5 years (range 1–14 years). Signs included inspiratory noise

(n = 5), cough (n = 5) and dysphagia (n = 4), with a median duration of 6 weeks (1–16 weeks).

Laryngeal lesions were unilateral in eight dogs and bilateral in three. Ten dogs were diagnosed with inflammatory disease including neutrophilic (n = 3), septic neutrophilic (n = 1), granulomatous (n = 2), eosinophilic (n = 1), lymphocytic/plasmacytic (n = 1) and mixed (n = 2). Three dogs underwent surgical excision of the lesion with adjunctive prednisolone (n = 2) or firocoxib (n = 1). Four dogs received corticosteroids without surgery (+/– antimicrobials) and one received antimicrobials alone. One dog was diagnosed with large cell lymphoma and was treated with chemotherapy. Nine dogs survived to discharge.

Follow-up was available for eight dogs diagnosed with inflammatory disease. Three had fully recovered (1, 23 and 32 months), one dog was receiving prednisolone (2 months) and four dogs had recurrence of clinical signs at 1, 5, 17 and 26 months, of which two were euthanased. The dog with lymphoma was in remission at 8 months.

## STATEMENT (CONCLUSIONS)

Dogs can suffer infiltrative disease of the larynx and, in this cohort, inflammatory disease was more common than neoplasia. For dogs that survived to discharge outcome was fair although relapse was possible.

Friday 5 April  
Bolton Room

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# Oncology

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- 452 14:45–15:00  
**Outcome of dogs with histologically low/immunohistochemistry high grade mast cell tumour treated with adjuvant chemotherapy**  
Slavomíra Něčová
- 452 15:00–15:15  
**Canine anal sac adenocarcinoma in a single referral centre – signalment, treatment and outcomes**  
Clare Doherty
- 453 15:15–15:30  
**Immunohistochemical expression of lipoxigenase-5 (LOX-5) in canine normal urinary bladder, cystitis and transitional cell carcinoma**  
Luca Schiavo
- 453 15:30–15:45  
**Genome-wide analysis of canine oral malignant melanoma (OMM) metastasis-associated gene expression**  
Kelly Bowlit Blacklock
- 454 16:50–17:05  
**Strontium 90 plesiotherapy in the treatment of eyelid squamous cell carcinoma in cats**  
Onne-Marju Russak
- 454 17:05–17:20  
**Correlation between BRAF Variant V595E and histological grade in canine transitional cell carcinoma**  
Corinna N. Weber
- 455 17:20–17:35  
**Ki67 index in canine dermal mast cell tumours: do we only identify proliferating mast cells?**  
Jean-Benoit Tanis
- 456 17:35–17:50  
**Canine hepatosplenic T-cell lymphoma treated with a lomustine-based chemotherapy protocol**  
Bryn Jones
- 456 17:50–18:05  
**The frequency of immunophenotyping and clonality detection in the diagnosis of feline lymphoma**  
Anne Aworinde

## Oral presentations

# Outcome of dogs with histologically low/immunohistochemistry high grade mast cell tumour treated with adjuvant chemotherapy

**Slavomíra Néčová, Sarah Mason, Susan North**

Southfields Veterinary Specialists, Laindon, United Kingdom

### OBJECTIVES

This retrospective study evaluates the outcome of dogs with histologically low/immunohistochemistry high grade mast cell tumour (MCT) treated with adjuvant lomustine and reports treatment toxicity.

### METHODS

The records of dogs treated with adjuvant chemotherapy for intermediate grade mast cell tumour with low mitotic

index ( $\leq 5/10$ HPF) and high Ki67 ( $\geq 1.8\%$ ) with no evidence of metastatic disease at presentation were reviewed. Lomustine was administered every 3 weeks with 3 or 4 planned cycles. Patients were followed up by regular re-staging ultrasound with or without cytopathological examination of liver and spleen or through medical records from the referring veterinarian. Disease free interval (DFI) and median survival time (MST) were calculated using Kaplan-Meier method.

### RESULTS

Twenty-five dogs were included. All dogs underwent surgical excision and four dogs received adjuvant radiotherapy. None of the patients developed local recurrence. Three dogs (12%) developed metastatic disease. The DFI of these dogs was 141, 186 and 223 days. DFI of the whole study population was 1063 days (141–2619). MST for patients with metastatic disease was 417 days. MST of the whole group was not reached. One-year, 2-year and 3-year survivals was 96%, 92% and 85%, respectively. The main adverse event was hepatotoxicity which occurred in 28% of patients.

### STATEMENT (CONCLUSIONS)

This study population showed low rates of tumour recurrence and improved survival compared to previously published data of dogs with immunohistologically high grade MCT without adjuvant chemotherapy. Prospective studies should be considered to evaluate this further.

# Canine anal sac adenocarcinoma in a single referral centre – signalment, treatment and outcomes

**Clare Doherty, Charles Pittaway**

University of Cambridge, Cambridge, United Kingdom

### OBJECTIVES

Canine anal sac adenocarcinoma (ASAC) is a neoplasm with a diverse clinical behaviour and no gold standard of care apart from surgical excision of disease. This study aimed to report the signalment, treatment and outcomes of dogs with ASAC treated at a single referral centre.

### METHODS

This was a retrospective study that included dogs diagnosed with ASAC that presented for diagnostics or

treatment. 41 dogs were identified following review of clinical records, between 2015 and 2018. Signalment, stage, treatment and outcomes were recorded.

### RESULTS

Labradors and cocker spaniels were the most commonly represented breeds. 27 dogs were male neutered and 13 dogs were female neutered. 28 dogs (68%) had metastasis to the loco-regional lymph nodes, of which 7 dogs (17%) also had distant metastases. 14 dogs were hypercalcaemic (34%). 5 dogs (13%) presented with bilateral tumours. Median survival time was 265 days (range: 76–670 days). Dogs treated only with surgery had the highest median survival time (433 days), and multiple surgeries were associated with longer survival. 16 dogs were treated with toceranib phosphate. Overall clinical benefit was seen in 10 dogs (63%). The median duration of response was 91 days (range 30–382 days).

### STATEMENT (CONCLUSIONS)

This study suggests that surgery is the most effective treatment for ASAC. Overall clinical benefit was seen using toceranib phosphate in >60% of dogs treated for a median duration of 3 months.



# Immunohistochemical expression of lipoxxygenase-5 (LOX-5) in canine normal urinary bladder, cystitis and transitional cell carcinoma

**Luca Schiavo<sup>1</sup>, Ranieri Verin<sup>2</sup>,  
Lorenzo Ressel<sup>2</sup>, Eva Frohmader<sup>3</sup>,  
Paolo Silvestrini<sup>1</sup>, Riccardo Finotello<sup>1</sup>**

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- 2 Department of Veterinary Pathology and Public Health, Institute of Veterinary Science, University of Liverpool, Leahurst campus, Neston, United Kingdom
- 3 Institute of Veterinary Science, University of Liverpool, Liverpool, United Kingdom

## OBJECTIVES

Canine transitional cell carcinoma (TCC) mimics human invasive TCC. Human TCC overexpress lipoxxygenase (LOX)-5 and the use of target inhibitors has been proved effective. In this study, we investigated the immunohistochemical (IHC) expression of LOX-5 in normal canine urinary bladder, cystitis and TCC. LOX-5, cyclooxygenase

(COX)-1, COX-2 IHC expression and their relationship among the different groups were investigated.

## METHODS

Biopsies of cystitis and TCC were reviewed (2012–2016). Dogs were excluded if had received steroids, non-steroidal antiinflammatory drugs (NSAIDs) and/or chemotherapy prior to tissue collection. Samples of histologically normal bladder were retrieved from the necropsy archive. Representative sections were submitted for anti-LOX5, COX-1 and COX-2 IHC. Distribution and intensity were assessed semi-quantitatively and an IHC score was obtained for each marker. Immunohistochemical results were compared among normal epithelium, cystitis and TCCs. Correlations between variables were analysed with Spearman and Mann Whitney.

## RESULTS

Twenty-nine TCCs, 13 cystitis and 10 controls were included. All TCCs were diagnosed as invasive and histologically high-grade. Cystitis were characterised by similar lymphoplasmacytic and occasionally neutrophilic infiltrates. LOX-5 was expressed in 95% of TCCs, 23% of cystitis and 10% of controls. LOX-5 and COX-2 IHC scores were significantly ( $P < 0.01$ ) higher in TCCs vs cystitis and normal bladders.

## STATEMENT (CONCLUSIONS)

TCC is the most common canine urinary-tract tumour. Chemotherapy is commonly advised, but responses are poor to modest. Results of this study place the rationale for the investigation of new agents such as tepoxalin, an NSAID with anti COX-2 and LOX-5 effect.

# Genome-wide analysis of canine oral malignant melanoma (OMM) metastasis-associated gene expression

**Kelly Bowlt Blacklock<sup>1</sup>, Zeynap Birand<sup>1</sup>,  
Laura Selmic<sup>2</sup>, Pieter Nelissen<sup>3</sup>,  
Sue Murphy<sup>4</sup>, Laura Blackwood<sup>5</sup>,  
Joyce Bass<sup>6</sup>, Jenny McKay<sup>7</sup>, Trevor  
Whitbread<sup>8</sup>, Richard Fox<sup>6</sup>, Tom Eve<sup>6</sup>,  
Stuart Beaver<sup>9</sup>, Mike Starkey<sup>1</sup>**

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- 7 IDEXX laboratories, Newmarket, United Kingdom
- 8 Abbey Veterinary Services, Devon, United Kingdom
- 9 Nationwide Laboratories, Leeds, United Kingdom

## OBJECTIVES

Melanoma of the oral cavity is the most common melanocytic neoplasm in dogs and has a high metastatic potential. The study objective was to identify a canine primary OMM pro-metastatic gene expression signature.

## METHODS

Canine Gene 1.1 ST Arrays were employed for comparative genome-wide expression profiling of formalin-fixed paraffin-embedded biopsies of 18 canine primary OMM that metastasised and 10 canine primary OMM that did not metastasise. Results were validated by RT-qPCR.

# Oral presentations

## RESULTS

Differential expression of the C-X-C Motif Chemokine Ligand 12 (*CXCL12*) between the M and NM OMMs suggests that canine OMM metastasis is mediated by interaction between *CXCL12* and *CXCR4*. Increased expression of Apolipoprotein B mRNA Editing Enzyme Catalytic Subunit 3A (*APOBEC3A*) in the M OMMs may be indicative of *APOBEC3A*-induced double-strand DNA breaks and pro-metastatic *APOBEC3A*-mediated hypermutation. DNA double strand breakage triggers activation of the DNA damage response network and two members of the Falconi anaemia DNA repair pathway show elevated expression in the M OMMs.

RT-qPCR analysis validated the greater than two-fold differences in expression between M and NM OMMs observed for 3 genes (*APOBEC3A*, *CXCL12* and *RPL29*). A Linear Discriminant Analysis classifier featuring the 3 genes was estimated to categorise M OMMs as metastasising with an accuracy of 94% and NM OMMs as non-metastasising with an accuracy of 86%.

## STATEMENT (CONCLUSIONS)

Metastasis-associated differences in gene expression may highlight genes that constitute targets for anti-metastasis treatments, and that may be effective as predictive biomarkers of OMM metastasis.

## Strontium 90 plesiotherapy in the treatment of eyelid squamous cell carcinoma in cats

Onne-Marju Russak<sup>1</sup>, Sara Verganti<sup>1</sup>, Davide Berlato<sup>2</sup>

<sup>1</sup> Animal Health Trust, Newmarket, United Kingdom

<sup>2</sup> Dick White Referrals, Six Mile Bottom, United Kingdom

## OBJECTIVES

Squamous cell carcinoma (SCC) is the most common tumour in cats' eyelid. Aggressive surgery is the treatment of choice, but in some cases a more conservative approach could be considered. Strontium 90 plesiotherapy (Sr90) is a form of radiotherapy targeting superficial tumours. The aim of this study was to describe response, outcome and tolerance of eyelid SCCs treated with Sr90.

## METHODS

The clinical database was searched for cats diagnosed with SCC located on an eyelid and treated with Sr90. The response to the treatment was evaluated every 4–6 weeks initially and then every 3 months. Descriptive statistics were applied on data collected.

## RESULTS

Eight cats were treated with Sr90 between 2014 and 2017, six as a primary and two as adjuvant treatment. Four cats received a single dose between 100–120 Gy and four cats five fractions in 10 days to a total dose of 140 Gy. Five of six cats treated with primary Sr90 achieved complete response (CR) and one partial response (PR) for an overall response rate of 100%. The five cats achieving CR were free of disease after a median of 17 months, while the cat with PR did not present evidence of progression at 18 months. One cat treated with adjuvant Sr90 was free of disease at 17 months, while the other one died in clinical remission 9 months post-treatment. Acute and late side effects were minimal.

## STATEMENT (CONCLUSIONS)

Sr90 provided good local control in this small cohort of cats and was well tolerated.

## Correlation between BRAF variant V595E and histological grade in canine transitional cell carcinoma

Corinna N. Weber<sup>1</sup>, Peter Pantke<sup>2</sup>, Julia Grassinger<sup>1</sup>, Hannah Erhard<sup>1</sup>, Robert Klopffleisch<sup>3</sup>, Francesco Cian<sup>4</sup>, Heike Aupperle-Lellbach<sup>1</sup>

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<sup>4</sup> Batt Laboratories Ltd., Coventry, United Kingdom

## OBJECTIVES

Mochizuki et al. (PLoS ONE 2015a, 10(6):e0129534; PLoS ONE 2015b, 10(12):e0144170) found BRAF mutation (Variant c.1784T > A) in 67–75% canine transitional cell carcinomas (TCCs). Maeda et al. detected BRAF mutation in 54.5% of TCC cases (BMC Cancer 2018). In our recent publication the mutation was found in 22 out of 31 (71%) canine TCC cases (Tierärztl. Prax. 5/2018). The objective of the present study was to investigate the correlation of BRAF variant V595E and histological grading of TCC.

## METHODS

Biopsies from 92 dogs with TCC were routinely processed for histopathology and graded into low grade or high grade, according to Meuten & Meuten (2017). DNA-isolation from paraffin embedded material was performed with the use of commercially available sets. Exon 15 was examined for the presence of the BRAF variant c.1784T > A by TaqMan® SNP Assay.

## RESULTS

64/92 TCCs were classified as high grade and 28/92 as low grade. BRAF mutation was found in 33/64 (51.5%)

of the high grade and in 12/28 (42.8%) of low grade TCCs.

## STATEMENT (CONCLUSIONS)

BRAF variant analysis is a new, highly specific diagnostic test for TCC. However, it is important to note that only identification of the mutation is diagnostic. It must be taken into consideration that histologically low grade TCCs showed the mutation in only about 40% of the cases. Further studies of clinical outcome are ongoing to evaluate the prognostic relevance of this finding. Additional factors, such as breed and anatomical site of the neoplasm may also influence the prevalence of BRAF mutation.

# Ki67 index in canine dermal mast cell tumours: do we only identify proliferating mast cells?

**Jean-Benoit Tanis<sup>1</sup>, Riccardo Finotello<sup>1</sup>,  
David Brewer<sup>2</sup>, Giulia Scarin<sup>3</sup>,  
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- 3 Faculty of Veterinary Medicine, University of Padova, Padova, Italy

## OBJECTIVES

Ki67 index is considered to be a prognostic marker for canine mast cell tumours (MCTs). High Ki67 index is associated with shorter survival times, however long-term outcomes can also be observed. Ki67 index is determined by counting the number of Ki67 positive cells but this method does not discriminate proliferating mast cells from other proliferating cells. Our objective was to

assess the "true" number of Ki67 positive mast cells in canine MCTs.

## METHODS

Patnaik grade-II MCTs were stained with a double KIT/Ki67 immunohistochemistry (IHC) technique. Mast cells were defined as "KIT positive (+)" and stromal cells were defined as "KIT negative (-)" cells. Proliferating cells were Ki67+ and non-proliferating cells were Ki67-. The proportion of Ki67+/KIT+, Ki67+/KIT-, Ki67-/KIT+, Ki67-/KIT- was evaluated.

## RESULTS

Twenty-one MCTs were assessed. The median percentage of mast cells per MCT was 56.3% (9.7–87.6%). Ki67 index was correlated with both proliferating mast cells and proliferating stromal cells. There was no correlation between the number of proliferating mast cells and the number of proliferating stromal cells. In seven MCTs (33%), proliferating stromal cells outnumbered proliferating mast cells. Among the eight MCTs with high Ki67, two had more proliferating stromal cells than proliferating mast cells and the percentage of proliferating mast cells was low.

## STATEMENT (CONCLUSIONS)

Ki67 index can overestimate the number of proliferating mast cells and double KIT/Ki67 IHC allows to determine the "true" number of proliferating mast cells. This method might provide better prognostic information and should be prospectively evaluated in canine MCT.

## Oral presentations

# Canine hepatosplenic T-cell lymphoma treated with a lomustine-based chemotherapy protocol

**Bryn Jones, Katarzyna Purzycka**

Department of Clinical Science and Services, The Royal Veterinary College, Hawkshead Lane, North Mymms, Hatfield, Hertfordshire, AL9 7TA, United Kingdom

### OBJECTIVES

T-cell hepatosplenic lymphoma is a distinct anatomical entity in dogs and humans. It is characterized by neoplastic infiltration of the liver and/or spleen with gamma-delta T-cells without peripheral lymphadenopathy. Typically the clinical course is very aggressive and responses to treatment are very poor in dogs and humans. Currently, there are no studies reporting successful treatment outcome in dogs with confirmed T-cell immunophenotype treated with lomustine-based chemotherapy protocols. The aim was to describe a small cohort of dogs diagnosed with hepatosplenic

T-cell lymphoma and treated with lomustine-based chemotherapy protocols.

### METHODS

We retrospectively identified 5 dogs fulfilling the criteria.

### RESULTS

All patients presented in substage B with the most common clinical signs being lethargy and gastro-intestinal signs. All patients had T-cell immunophenotype confirmed by PARR (n = 4) or flow cytometry (n = 1) and lacked peripheral lymphadenomegaly. Hepatic involvement was documented cytologically in all patients. Splenic involvement was documented in one, although splenic aspirate was performed in only two patients. In 2/5 patients, pulmonary involvement was suspected. All dogs received a lomustine-based protocol with L-asparaginase and with (n = 4) or without (n = 1) procarbazine. 3 dogs showed complete and 2 dogs partial resolution of clinical signs. The median duration of the response was 117 days. The mean and median overall survival times were 98 and 134 days respectively.

### STATEMENT (CONCLUSIONS)

To our knowledge, this is the first report describing favourable responses to treatment of hepatosplenic T-cell lymphoma with a lomustine-based protocol, with clinical improvement documented in all dogs. Inclusion of more cases is necessary to further explore this treatment option.

# The frequency of immunophenotyping and clonality detection in the diagnosis of feline lymphoma

**Anne Aworinde<sup>1,2</sup>, Rachel Dean<sup>1</sup>, Peter Graham<sup>1</sup>**

<sup>1</sup> University of Nottingham, Nottingham, United Kingdom

<sup>2</sup> Consolidated Veterinary Services, Norfolk, United Kingdom

### OBJECTIVES

T-cell lymphomas in dogs generally have a relatively worse prognosis than B-cell lymphomas. Few reports in cats with lymphoma have attempted to prove or refute this notion. This study aims to determine the proportion of cats with lymphoma that are subtyped as part of a larger study on the frequency of lymphoma-specific treatment and the relationships between subtype and survival.

### METHODS

Consolidated Veterinary Services (CVS) laboratory databases were retrospectively searched to identify cats diagnosed with lymphoma by cytology and histopathology from 2014 to 2018. Data was collated in Microsoft Excel.

### RESULTS

1,682 cats with lymphoma were identified. Immunohistochemistry (IHC) (n = 88) and/or PCR for Antigenic Receptor Rearrangement (PARR) (n = 13) were requested in only 6% of the cases (n = 99), identifying 57 B-cell, 38 T-cell lymphomas, whilst 4 were inconclusive. Based on the lymphoid cell staining pattern observed at IHC, a further diagnosis of T-cell rich B cell lymphoma (TCRBCL) was made in 3 cases and Enteropathy-associated T-cell lymphoma (EATCL) in 2 cases.

### STATEMENT (CONCLUSIONS)

Immunophenotyping of feline lymphoma is seldom requested following a diagnosis of lymphoma, posing a challenge both for its evaluation as a prognostic tool in large retrospective studies and potentially its future utilisation as a prognostic tool.

Saturday 6 April  
Bolton Room

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## Exotics

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- 458 09:00–09:15  
**Comparison of rehabilitation and euthanasia rates of birds of prey at a UK raptor rehabilitation centre in 2007 and 2017**  
Helen Inzani
- 458 09:15–09:30  
**Do rodents in radioactive areas around Chernobyl, Ukraine have high prevalence of cataracts?**  
David Williams
- 459 09:30–09:45  
**Nidoviruses in snakes in Europe**  
Rachel E. Marschang
- 459 09:45–10:00  
**Patterns of antimicrobial prescription in rabbits attending first-opinion practices in the UK**  
Samuel Pearce
- 460 10:00–10:15  
***Enterobacter asburiae* infection in Dusky (*Pseudeos fuscata*) and Ornate Lorikeets (*Trichoglossus ornatus*)**  
Sarah Pellett

# Comparison of rehabilitation and euthanasia rates of birds of prey at a UK raptor rehabilitation centre in 2007 and 2017

Helen Inzani<sup>1</sup>, David Williams<sup>2</sup>

<sup>1</sup> All Creatures Healthcare, Taverham, United Kingdom

<sup>2</sup> University of Cambridge Veterinary School, Cambridge, United Kingdom

## OBJECTIVES

The proportion of rescued birds rehabilitated and released into the wild in a UK raptor rehabilitation were compared between 2007 and 2017 after greater enforcement by the Department of Environment Food and Rural Affairs of legislation regarding temporary captivity of birds for rehabilitation.

## METHODS

Records kept by the rehabilitation centre for raptors brought to the centre were evaluated to determine which

birds were subsequently treated and released, treated and retained alive as unable to be released, treated and died, or euthanased on welfare grounds. Proportions were compared for 2007 and 2017.

## RESULTS

Proportions of birds which were released, died, were euthanased or kept in captivity were 59.8%, 28.6%, 9.8% and 1.8% in 2007 and 30.3%, 30.4%, 39.4% and 0% in 2017. A significant difference was determined between birds released in 2007 and 2017 ( $p = 0.007$ ) and birds euthanased in those years ( $p = 0.0001$ ). There was not a significant difference in birds that died between the two years. Significantly more kestrels were admitted in 2017 and Tawny owls in 2007 but differences in these numbers did not account for the variation in proportion released or euthanased between 2007 and 2017.

## STATEMENT (CONCLUSIONS)

The greater number of birds released in 2007 compared with 2017 and euthanased in 2017 compared with 2007 were most likely related to increased enforcement of legislation requiring the centre to euthanase birds which could not rapidly be rehabilitated and released. Whether this change is beneficial to the individual birds or the avian population is a topic worthy of further discussion.

# Do rodents in radioactive areas around Chernobyl, Ukraine have high prevalence of cataracts?

David Williams

University of Cambridge, Cambridge, United Kingdom

## OBJECTIVES

Previous reports suggested that rodents in the highly radioactive zones of the Chernobyl Exclusion Zone have increased prevalence of cataracts, these seen at post-mortem examination. While radiation-induced cataractogenesis might be conceivable in long-lived birds, and 25% of the liquidators who sought to control the spread of radiation after the nuclear disaster in 1986 developed cataracts characteristic of radiation exposure 15 years after the disaster, bank voles and field mice, which only

live for up to 2 years, are unlikely to develop cataracts with the levels of radiation now seen around the contaminated reactor site. This study investigated the lenses of live bank voles and field mice trapped around Chernobyl as part of a study on radiation-induced disease.

## METHODS

Rodent species were trapped in a number of areas around the Chernobyl radiation contamination exclusion zone and examined ophthalmoscopically with slit-lamp biomicroscopy. Degree of correlation was evaluated between prevalence of cataract and level of radioactive contamination in the area from which the animal was trapped. A control population from the UK was also examined.

## RESULTS

While small lens opacities were noted, these were not the substantial mature cataracts noted in previous reports of animals examined after death. No correlation could be made between cataract prevalence and radioactivity in the areas from which the animals were obtained.

## STATEMENT (CONCLUSIONS)

If cataract were associated with the levels of radioactivity noted around Chernobyl our understanding of radiation safety would have to change. As it is, there does not seem to be such a correlation in the rodents around Chernobyl.

# Nidoviruses in snakes in Europe

**Rachel E. Marschang, Ekaterina Kolesnik, Elisabeth Müller**

Laboklin GmbH & Co. KG, Bad Kissingen, Germany

## OBJECTIVES

Nidoviruses are single stranded RNA viruses that were first described in reptiles in 2014. They can cause severe respiratory disease in numerous python species. The aim of this study was to determine the prevalence of these pathogens in samples from snakes submitted to a diagnostic laboratory in Europe.

## METHODS

Samples from 1171 snakes were tested for the presence of nidoviruses between January 2016 and September 2018. The majority of samples were oral swabs. Each sample was tested for the presence of nidoviral RNA by PCR.

Samples were from a wide range of species, including ball pythons (*Python regius*, 343 animals) and green tree pythons (*Morelia viridis*, 214 animals). In many cases, the species was not specified.

## RESULTS

A total of 300 of the snakes examined (25.6%) were positive for nidoviruses, including 76 (22.2%) ball pythons and 69 (32.2%) green tree pythons. There was a significant difference in the likelihood of virus detection between these two species ( $p = 0.008329$ ). Evaluation of the results over time showed no seasonal pattern in the detection rates. Positive samples were obtained from animals in Great Britain, Germany, Austria, Switzerland, Spain, France, Belgium, the Netherlands, Denmark, Poland, Sweden, Italy, and the Czech Republic.

## STATEMENT (CONCLUSIONS)

This study shows that nidoviruses are important pathogens in pythons in Europe and are widespread throughout the continent. Interestingly, green tree pythons appear to be more commonly infected than other python species.

# Patterns of antimicrobial prescription in rabbits attending first-opinion practices in the UK

**Samuel Pearce, Dr Fernando Sánchez-Vizcaíno**

Bristol Veterinary School, University of Bristol, Bristol, United Kingdom

## OBJECTIVES

To describe antimicrobial prescription patterns in rabbits attending first-opinion practices in the UK.

## METHODS

Electronic health records (EHRs) were collected through the Small Animal Veterinary Surveillance Network from March 2014 to June 2018. EHRs included information on the consultation date, animal signalment and main presenting complaint. EHRs further included product descriptions as defined by individual practices and, where possible, further product information. Product descriptions with no pharmaceutical information

recorded were reviewed and if an antimicrobial was identified, it was manually defined with reference to the Veterinary Medicines Directorate's Product Information Database for veterinary authorised products, and the electronic Medicines Compendium for human authorised products. Descriptive statistics and data visualisation were conducted using R language.

## RESULTS

A total of 74,621 rabbit consultations were gathered from 498 veterinary premises nationwide. During the study, 21.7% of rabbits were exposed to at least one antimicrobial. A negative trend was observed for the prescription rate over the 4-year period. Antimicrobials were most commonly prescribed in respiratory disease-related consultations (67.7% of respiratory consultations). Systemic and topical antimicrobial agents represented 63.7% and 35.9% of all prescriptions, respectively, the rest being unidentified. The most commonly used antimicrobials were fluoroquinolones (49.8% of all prescriptions). Finally, 12.7% of all prescriptions were human authorised.

## STATEMENT (CONCLUSIONS)

The study suggests a reduction in antimicrobial prescribing in rabbits, which may reflect the success of awareness campaigns. This study will form the basis of future research into antimicrobial prescribing and antimicrobial resistance in rabbits, providing valuable data that the profession needs to ensure antimicrobials are used responsibly.

# *Enterobacter asburiae* infection in Dusky (*Pseudeos fuscata*) and Ornate Lorikeets (*Trichoglossus ornatus*)

Sarah Pellett<sup>1</sup>, Mary Pinborough<sup>2</sup>

<sup>1</sup> Animates Veterinary Clinic, Thurlby, United Kingdom

<sup>2</sup> Pinmoore Animal Laboratory Services, Clotton, United Kingdom

## OBJECTIVES

Diseases may spread within collections if birds are purchased with underlying conditions and owners do not follow appropriate quarantine methods. This case study follows an 18-month history of Lorikeets that were dying of progressive hyperkeratotic lesions around and inside the oral cavity. Five years previously *Chlamydia psittaci* infection had been diagnosed and the birds treated with doxycycline.

## METHODS

Nutritional causes were ruled out on history. Diagnostics included faecal analysis; avian pox virus PCR; and biopsy

for histopathology and for bacterial and fungal culture and sensitivity.

## RESULTS

*Escherichia coli* and *Enterobacter asburiae* were isolated with sensitivities to enrofloxacin, marbofloxacin, trimethoprim/sulfamethoxazole and ceftiofur. Selective yeast/fungal cultures were positive for yeasts, which was confirmed on histopathology using Periodic acid–Schiff stain. Avian pox virus PCR was negative. Faecal analysis was unremarkable.

*E. asburiae* may cause necrotising fasciitis and has zoonotic implications in immunocompromised individuals. *E. asburiae* strains have been isolated from the soil and water. Antimicrobial resistance has also been detected among Enterobacteriaceae isolated from wild bird faeces.

The affected birds were prescribed enrofloxacin (Baytril, Bayer) at a dose of 15 mg/kg administered daily for 21 days, with resolution of the lesions and no further recurrence.

## STATEMENT (CONCLUSIONS)

This case describes two species of lorikeet, diagnosed with *Chlamydia psittaci* initially and then *E. asburiae* more recently, both with zoonotic potential. *E. asburiae*, the causative agent for the skin lesions was deemed unusual. This case emphasises the importance of both routine screening and preventive hygiene measures such as assiduous hand washing, biosecurity and quarantine.



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# Other, therapeutics, non-clinical and behaviour, welfare & ethics

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- 462 11:05–11:20  
**Homeless people and their dogs: a study of health and welfare and the human-companion animal bond (H-CAB)**  
Louise Scanlon
- 462 11:20–11:35  
**Why didn't my client give the medication? A descriptive study of the communication surrounding medicine administration**  
Louise Corah
- 463 11:35–11:50  
**Factors that affect intended adoption of reward-based training reported by a cohort of puppy owners**  
Joshua Woodward
- 463 11:50–12:05  
**Opinions of veterinary graduates on the value of an undergraduate veterinary practical class**  
David Williams
- 464 12:05–12:20  
**"Trust me I'm a vet..." Vet-client trust in small animal consultations: a mixed methods approach**  
Louise Corah
- 464 12:20–12:35  
**Owner perceptions of problem behaviours in dogs aged 6 months**  
Michelle Lord
- 465 12:35–12:50  
**The referral surgeon-first opinion practitioner interaction is a source of communication breakdown in the surgical care pathway – a review of 112 questionnaire responses from first opinion practitioners**  
Barney Dean

## Oral presentations

### Homeless people and their dogs: a study of health and welfare and the human-companion animal bond (H-CAB)

**Louise Scanlon<sup>1,2</sup>, Jenny Stavisky<sup>1</sup>,  
Pru Hobson-West<sup>1</sup>, Anne McBride<sup>3</sup>,  
Kate Cobb<sup>1</sup>**

1 The University of Nottingham, Nottingham, United Kingdom

2 Dogs Trust, London, United Kingdom

3 University of Southampton, Southampton, United Kingdom

#### OBJECTIVES

Pet ownership is common amongst the UK's growing homeless population. Pet ownership can have positive impacts on physical, psychological and social health. For homeless owners, some of the most vulnerable members of society, dogs provide a crucial source of support and companionship. In spite of these benefits, dogs often exist as barriers to homeless services such as accommodation.

The study aims were to assess the impact of pet ownership and the H-CAB on the health and wellbeing of both homeless owners and their dogs.

#### METHODS

Participants were recruited from services that accommodated homeless dog owners; Nottingham's Vets in the Community clinic and other outreach initiatives, and by direct approach to homeless owners on the streets. The PDSA's Petwise MOT was used to assess canine health and welfare. Semi-structured interviews were used to investigate the implications of the H-CAB, these were anonymised, transcribed and analysed thematically.

#### RESULTS

Preliminary results suggest that the health and welfare of dogs belonging to homeless owners is not significantly compromised and that dogs often provide crucial support for issues such as mental ill-health, drug and alcohol abuse. Initial findings also indicate that many homeless owners struggle to access services as a result of their dog.

#### STATEMENT (CONCLUSIONS)

Dogs belonging to homeless owners provide key sources of support and companionship, often helping them manage physical, psychological and even social health. Contrary to the opinion of some, the health and welfare of these dogs is not significantly compromised by the homelessness of the owner, although specific challenges were identified.

### Why didn't my client give the medication? A descriptive study of the communication surrounding medicine administration

**Louise Corah<sup>1</sup>, Liz Mossop<sup>2</sup>, Rachel Dean<sup>3</sup>,  
Kate Cobb<sup>1</sup>**

1 School of Veterinary Medicine and Science, University of Nottingham, Sutton Bonington, United Kingdom

2 University of Lincoln, Lincoln, United Kingdom

3 VetPartners, York, United Kingdom

#### OBJECTIVES

Adherence with medication is critical to achieving optimal patient health outcomes. Unfortunately, there is

limited evidence regarding factors affecting adherence in veterinary medicine. The aim of this study is to describe the communication surrounding medicine administration.

#### METHODS

Clients attending six practices for specific health problem appointments were invited to participate in the study, which involved consultation recording and post-consultation surveys. If the pet was prescribed medication, drug labelling information was recorded, and the client was contacted 4–8 days later to complete a survey regarding adherence. Descriptive statistics were performed and proportional frequencies of responses reported.

#### RESULTS

Of the 65 consultations recorded, 43 were prescribed medication. Of these 29 responded, giving a response rate of 67.4%. Adherence was 100% in 27.6% (8/29) of respondents but assessment of adherence wasn't possible in 69% (20/29) due to drug formulation (e.g. oral liquid) or deficiencies in drug labelling; dosing duration was not stated on the medication label for 86.2% (25/29) of

prescriptions. One respondent elected not to give the medication. Only 55% of clients reported being shown how to administer the medication, and if they were shown, 75% reported being shown by their vet. Finally, 83% of clients reported no discussion of their personal situation to assess the suitability of the treatment schedule.

## STATEMENT (CONCLUSIONS)

Despite the small sample size, this study highlights significant issues in the communication of medicine administration which could affect adherence and subsequently patient outcomes. A larger study is needed to evaluate the scale of the problem.

# Factors that affect intended adoption of reward-based training reported by a cohort of puppy owners

**Joshua Woodward<sup>1</sup>, Rachel Casey<sup>1</sup>, Michelle Lord<sup>1</sup>, Rachel Kinsman<sup>1</sup>, Séverine Tasker<sup>2,3</sup>, Toby Knowles<sup>2</sup>, Rosa Da Costa<sup>1</sup>, Emma Buckland<sup>1</sup>, Jane Murray<sup>1</sup>**

- 1 Dogs Trust, London, United Kingdom
- 2 University of Bristol, Bristol, United Kingdom
- 3 Linnaeus Group, Shirley, United Kingdom

## OBJECTIVES

Almost all dog owners use reward-based training methods, but some additionally use aversive methods (e.g. physical reprimands, sound/spray distractions). Our objective was to identify factors associated with intended use of training approaches that used only reward-based methods.

## METHODS

A nested case-control study was conducted on a sample of owners of puppies <16 weeks of age, living in the UK

and Republic of Ireland recruited to a longitudinal study. For owners with >1 study dog, one dog was randomly selected for analysis.

Associations between intended training methods (reward-based methods only/training that included >1 aversive method) and potential risk factors (previous dog ownership, owning ≥1 other dog(s), dog-related employment [e.g. dog trainer, rehoming centre] and intentions for the dog) were tested using Chi-square ( $\alpha \leq 0.05$ ).

## RESULTS

Of 819 owners, 256 (31.3%) intended to use only reward-based methods. Owners who worked with dogs were three times more likely to report intention to use reward-based methods only, compared with owners without such employment (OR = 2.87, 95%CI = 1.79–4.60,  $P < 0.001$ ). Compared with owners who did not own another dog, owners with ≥1 other dog(s) were more likely to report intentions for training based only on reward-based methods (OR = 1.60, 95%CI = 1.19–2.16,  $P = 0.002$ ).

## STATEMENT (CONCLUSIONS)

Intention to use a mixture of reward-based/aversive training methods was very common within this cohort, despite existing evidence of the disadvantages of using mixed training approaches. Increased awareness of optimal training approaches for dogs is needed, especially for owners without dog-related employment and without other household dogs.

# Opinions of veterinary graduates on the value of an undergraduate veterinary practical class

**David Williams**

University of St Elsewhere Veterinary School, St Elsewhere, United Kingdom

## OBJECTIVES

It is widely accepted that animal tissue is required for teaching veterinary students various aspects of anatomy and physiology in their undergraduate years. Yet what are the views of veterinary graduates on the use of such practical classes in their education? Here the opinions of veterinary graduates were sought on the value of one practical class during their preclinical training and the justification for that class.

## METHODS

Fifty veterinary graduates were surveyed by e-mail asking for their opinions on the value of a preclinical practical class which aimed to demonstrate the effect of different

# Oral presentations

cardiac drugs. Their text responses were subjected to a thematic analysis and appropriately coded. Respondents were also asked to score their opinion of four statements regarding the educational value and ethical justification of the class on a Likert scale from strongly agree to strongly disagree. A small number of respondents took part in a telephone based semi-structured interview.

## RESULTS

All 50 graduates replied to the request for their opinions. The majority (46 of 50) considered that the practical class

was of little educational value and thus not particularly ethically justified. Several respondents noted that a video demonstration and computer-based learning would be more appropriate.

## STATEMENT (CONCLUSIONS)

As a result of the survey the practical class was changed to a predominantly video demonstration and computer-based learning session. The study shows the value of appraising student opinion in optimising practical classes in their education.

# "Trust me I'm a vet..." Vet-client trust in small animal consultations: a mixed methods approach

**Louise Corah<sup>1</sup>, Liz Mossop<sup>2</sup>, Rachel Dean<sup>3</sup>,  
Kate Cobb<sup>1</sup>**

- 1 School of Veterinary Medicine and Science, University of Nottingham, Sutton Bonington, United Kingdom
- 2 University of Lincoln, Lincoln, United Kingdom
- 3 VetPartners, York, United Kingdom

## OBJECTIVES

In human medicine, doctor-patient trust is correlated with positive outcomes such as medication adherence and patient satisfaction. The aim of this study is to report the perceptions and assessments of vet and client trust.

## METHODS

A convenience sample of vets and clients were invited to participate in focus groups and semi-structured

interviews. Data was transcribed intelligent verbatim, a thematic analysis performed, and themes identified. Subsequently, clients attending six practices for specific health problem appointments were invited to participate in consultation recording and post-consultation surveys assessing vet and client satisfaction, and client trust in the vet.

## RESULTS

Qualitative analysis highlighted the importance of trust in the vet-client relationship, leading to easier decision making, especially in high-emotion and uncertain situations. In post consultation surveys, percentage client satisfaction was high (median 88.7%, IQR 15.8), as was percentage trust in the vet (median 100%, IQR 5.5). In addition, client trust was positively correlated with client satisfaction (Spearman's rho = 0.531,  $p < 0.005$ ).

## STATEMENT (CONCLUSIONS)

This research highlights the mis-match between vet and client perceptions of trust and provides an insight into the importance and complexity of the vet-client relationship. The findings add further support for a relationship-centred approach to small animal consultations and could impact the morale and wellbeing of the veterinary profession.

# Owner perceptions of problem behaviours in dogs aged 6 months

**Michelle Lord<sup>1</sup>, Rachel Casey<sup>1</sup>,  
S  verine Tasker<sup>2,3</sup>, Toby Knowles<sup>2</sup>,  
Rachel Kinsman<sup>1</sup>, Rosa Da Costa<sup>1</sup>,  
Joshua Woodward<sup>1</sup>, Jane Murray<sup>1</sup>**

- 1 Dogs Trust, London, United Kingdom
- 2 University of Bristol, Bristol, United Kingdom
- 3 Linnaeus Group, Shirley, United Kingdom

## OBJECTIVES

To investigate early recognition of potentially problematic canine behaviours by UK and Republic of Ireland dog owners.

## METHODS

Puppy owners taking part in a longitudinal study relating to canine health and behaviour completed online

questionnaires detailing their dogs' responses to varied situations and experiences, and any canine behaviour(s) they found a problem.

## RESULTS

In the questionnaire for 6-month old dogs, owners reported problem behaviours in 199/636 (31.3%) dogs. Of the 199 dogs, help had only been sought for 78 (39.2%); from dog trainers (57/199;28.6%), behaviourists (22/199; 11.1%) and/or vets (9/199;4.5%).

Behaviours most commonly reported as problems were pulling on lead (26/199;13.1%), jumping up at people (22/199;11.1%), mouthing people (22/199;10.1%), and separation-related behaviour (SRB) (unwanted/undesirable behaviour in owner absence) (17/199;8.5%). Elsewhere in the 6-month questionnaire, data were available as to whether 'jumping up at people' and SRB

were displayed. Despite not noting the behaviour as 'a problem', a further 128/621 (20.6%) of dogs were reported to have jumped up at people and 345/619 (55.7%) had shown SRB ( $\geq 2$  signs were considered an accurate indication of SRB). Owners were more likely to report SRB than 'jumping up at people' as a problem, (OR = 4.85, 95% CI 3.77–6.23,  $P = <0.0001$ ).

## STATEMENT (CONCLUSIONS)

This study highlights behaviour(s) that owners of 6-month old dogs find problematic, thus enabling development of specific training plans to address these problems. Future work will include analysis of risk factors for owner-reporting of specific canine behaviours and assess escalation/resolution of specific behaviours in relation to perception of a problem and help sought.

# The referral surgeon-first opinion practitioner interaction is a source of communication breakdown in the surgical care pathway – a review of 112 questionnaire responses from first opinion practitioners

**Barnaby Dean<sup>1</sup>, Danny Chambers<sup>2</sup>**

<sup>1</sup> Southern Counties Veterinary Specialists, Ringwood, United Kingdom

<sup>2</sup> Langford Veterinary Services, Bristol, United Kingdom

## OBJECTIVES

Communication breakdown in the human healthcare environment has been identified as a source of patient morbidity and mortality. While many clinicians across all clinical veterinary roles employ protocols to ensure effective communication within their own institutions, the referral surgeon-first opinion practitioner interaction has not been previously investigated. The aim of this study

was to identify sources of communication breakdown in the referral surgeon-first opinion practitioner interaction.

## METHODS

A 15-question questionnaire was designed to investigate first opinion practitioner attitudes and approaches to performing postoperative examinations on referred surgical cases. The questionnaire was posted on a social media-based veterinary discussion forum (Veterinary Voices UK) inviting anonymous responses from small animal first opinion practitioners who referred at least one surgical case to a referral institution during the previous 12-months. The questionnaire remained open to responses for seven days. Results were presented as descriptive data.

## RESULTS

One-hundred and twelve first opinion practitioners responded to the questionnaire. Results reveal that 75.0% and 58.0% of respondents never, rarely or sometimes felt adequately prepared to formulate future care plans in referred surgical cases with and without complications, respectively. In addition 23.2% of respondents never, rarely or sometimes informed referral surgeons of complications and 26.8% of respondents never, rarely or sometimes discussed future management of complications with the referral surgeon.

## STATEMENT (CONCLUSIONS)

Results of this study suggest that the referral surgeon-first opinion practitioner interaction is a source of communication breakdown bilaterally. Referral surgeons and first opinion practitioners should ensure that communication between both parties is sufficient to ensure appropriate continuity of care.



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# Haematology & immunology

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- 468 14:00–14:15  
**Retrospective clinical evaluation of cats receiving whole blood transfusions and frequencies of blood types at a UK private referral hospital**  
Harriet Hall
- 468 14:15–14:30  
**Red blood cell blood transfusions and occurrence of adverse reactions: a retrospective study in 101 dogs**  
Consuelo Alonzi
- 469 14:30–14:45  
**The influence of prior corticosteroid administration on diagnostic imaging findings in dogs with Immune-Mediated Haemolytic Anaemia**  
Joshua Hardwick
- 469 14:45–15:00  
**Presenting signs and clinical outcome in dogs with metaphyseal osteopathy, 32 cases (2009–2018)**  
Alison Robertson
- 470 15:00–15:15  
**Characterisation and outcome of idiopathic sterile steroid-responsive lymphadenitis in English Springer Spaniels: a multicentre study of 64 cases**  
Cécile Dor
- 471 15:15–15:30  
**Feline bone marrow aspiration: triggers for sampling and disease prevalence**  
Alba Maldonado-Moreno
- 471 15:30–15:45  
**Proteinuria in canine non-erosive immune mediated polyarthritis**  
Lucy Barker

## Oral presentations

### Retrospective clinical evaluation of cats receiving whole blood transfusions and frequencies of blood types at a UK private referral hospital

Harriet Hall<sup>1,2</sup>, Simon Tappin<sup>1,2</sup>

1 Dick White Referrals, Newmarket, United Kingdom

2 The University of Nottingham, School of Veterinary Medicine and Science, Nottingham, United Kingdom

#### OBJECTIVES

To assess prevalence of blood type and indication for transfusion including patient outcome, transfusion efficacy and reactions in cats admitted to a single institution.

#### METHODS

A retrospective case series was performed selecting feline patients where whole blood transfusions were indicated, that were blood typed using typing kits and

identified through database searches between 01-01-2008 and 01-08-2018.

#### RESULTS

Searches identified 166 blood typed patients; 64 received 68 whole blood transfusions. Prevalence of blood types for domestic cats ( $n = 116$ ) was 76.7%, 18.1% and 5.2%; for pedigree cats ( $n = 50$ ), 78.0%, 20.0% and 2.0% for groups A, B and AB respectively. Transfusions ( $n = 68$ ) were divided into groups 1–3 respectively; destruction of red blood cells (RBC's) ( $n = 25$ ), reduced erythropoiesis ( $n = 15$ ) and loss of RBC's ( $n = 28$ ). Survival rate to >30 days post-transfusion was 56.0%, 6.7% and 53.6% for groups 1–3. For trauma patients within group 3 ( $n = 14$ ) survival rate to >30 days was 78.6%. Total transfusion and transfusion naive reaction incidences were 22.1% and 21.3% respectively. Half of cross matched patient reactions (26.7%) and of the two severe reactions were transfusion naive. Three formulae previously used to estimate post-transfusion packed cell volume (PCV) were applied to a subpopulation ( $n = 43$ ); donor PCV and post-transfusion PCV ( $\leq 48$  hours) were recorded. Bland-Altman analysis compared PCV rise with each formula's estimation. Formula 1 assumed 2 ml/kg of whole blood increased PCV by 1%, achieving the lowest overall bias (0.27%).

#### STATEMENT (CONCLUSIONS)

Sourcing feline blood is challenging therefore prognosis should be thoroughly considered before transfusion. Overall prevalence of transfusion reactions was 22.1%.

### Red blood cell blood transfusions and occurrence of adverse reactions: a retrospective study in 101 dogs

Consuelo Alonzi, Simon Tappin

Dick White Referrals, Six Mile Bottom, Cambridgeshire, United Kingdom

#### OBJECTIVES

To describe type and frequency of canine transfusion reactions; to investigate any correlation as to their occurrence.

#### METHODS

Retrospective study of dogs receiving red blood cell transfusions between 1/10/15 and 1/7/18 at a single referral centre.

#### RESULTS

165 transfusion events were recorded in 101 dogs. 129 transfusions were packed red blood cells (pRBCs), 36 whole blood (WB). Chlorphenamine was administered before 9/165 transfusions.

Adverse reactions were recorded in 44/165 transfusion events; 23/44 were febrile non-haemolytic reactions (increase in rectal temperature  $>39.2^{\circ}\text{C}$ ). Vomiting alone was recorded in 7/44 dogs; 5/44 with hyperthermia and 1 vomit with increased respiratory effort. Acute haemolytic reactions occurred in 5/44 dogs, 2 dogs showed haematuria. Increased respiratory effort (4/44), acute tachycardia (3/44) cases, acute tachypnoea (1/44), anaphylactoid reaction (1/44), respiratory arrest (1/44) and neurological signs compatible with thromboembolic event (1/44).

59/101 dogs receiving a transfusion were affected by an immune mediated disease; 30/59 (52%) had a



transfusion reaction. 25/30 adverse events occurred after a pRBCs transfusion; 5/30 after WB transfusion. The portion of adverse reactions was (37/129) with pRBCs and (7/36) after WB. 23/44 (52%) reactions occurred in dogs receiving single transfusions; 17/44 (38%) occurred after multiple transfusions. Of the 43 dogs receiving multiple transfusions, 10 (23%) had repeated reactions.

## STATEMENT (CONCLUSIONS)

Immune-mediated disease was the commonest cause of transfusion-dependent anaemia. Treatment with corticosteroids did not decrease the incidence of transfusion reactions. Performance of more than one transfusion was not associated with an increased risk of adverse reactions.

# The influence of prior corticosteroid administration on diagnostic imaging findings in dogs with Immune-Mediated Haemolytic Anaemia

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## OBJECTIVES

To evaluate whether prior corticosteroid administration influences imaging findings in dogs with immune-mediated haemolytic anaemia (IMHA).

## METHODS

Retrospective review of case records of a referral population of dogs with IMHA, for whom medical histories and thoracic and/or abdominal imaging studies were available.

Cases were classified based upon presence (S+) or absence (S-) of corticosteroid administration prior to

referral. Thoracic and abdominal imaging findings were categorized into (a) clinically significant findings altering case management or follow-up, including potential triggers; (b) incidental, clinically insignificant; (c) attributable to IMHA; (d) normal. For statistical analysis, significant imaging findings (a) versus non-significant imaging findings (b, c and d) were compared in S+ and S- dogs, using  $\chi^2$  test to determine whether prior corticosteroids significantly influenced imaging findings.

## RESULTS

55 dogs met the inclusion criteria, comprising 23 S+ and 32 S-. 46 had thoracic and abdominal imaging. 2 and 7 dogs had only thoracic or abdominal imaging, respectively. The 48 thoracic studies comprised 25 computed-tomographic and 23 plain radiographic. The 53 abdominal studies comprised 24 computed-tomographic and 29 ultrasonographic.

Thoracic imaging findings were clinically significant in 6/19 S+ dogs and 6/29 S- dogs. Abdominal imaging findings were clinically significant in 13/22 S+ dogs and 19/31 S- dogs. Incidence of clinically significant thoracic or abdominal imaging findings did not differ between S+ and S- dogs ( $p < 0.05$ ).

## STATEMENT (CONCLUSIONS)

In this population, prior corticosteroid administration did not significantly influence imaging findings. Imaging for underlying disease in IMHA is therefore considered worthwhile, even if corticosteroids have been administered.

# Presenting signs and clinical outcome in dogs with metaphyseal osteopathy, 32 cases (2009–2018)

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<sup>4</sup> Royal (Dick) School of Veterinary Studies, Edinburgh, United Kingdom

## OBJECTIVES

To describe presentation, treatment, and clinical outcome of dogs with metaphyseal osteopathy.

## METHODS

Multi-centre retrospective review of medical records from January 2009 to September 2018 at three referral

# Oral presentations

centres to identify dogs with radiographical evidence of metaphyseal osteopathy.

## RESULTS

Thirty-two dogs were identified. Median age at onset was 13 weeks old (range 8–32 weeks old), males were over-represented (75% male entire, 22% female entire, 3% female neutered). The most commonly recorded clinical signs were pain (32/32), pyrexia (29/32), lethargy (28/32), and being non-ambulatory (17/32). Sixteen of thirty-two dogs were affected in all four limbs, thirteen had forelimbs affected, three were affected in three limbs. Where information was available, 18/27 dogs were vaccinated within 30 days of presentation. Twenty-nine dogs required hospitalisation for analgesia and supportive care, 16/32 were discharged on corticosteroids (dose

range 0.9–2.6 mg/kg/day), 14/32 were discharged on non-steroidal anti-inflammatories, 2/32 were discharged on analgesia only. Dogs were discharged when ambulatory, with a median duration of hospitalisation of 5 days (range 2–21 days). Relapse occurred in 10/32 cases before reaching skeletal maturity. Seven cases went on to develop other immune-mediated conditions.

## STATEMENT (CONCLUSIONS)

Metaphyseal osteopathy should be considered in non-ambulatory painful young dogs. Recent vaccination was common, however causation cannot be established given age at onset of signs. Some dogs went on to develop other immune mediated conditions, further studies with a larger cohort are required to determine the clinical significance of this.

# Characterisation and outcome of idiopathic sterile steroid-responsive lymphadenitis in English Springer Spaniels: a multicentre study of 64 cases

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Andre Kortum<sup>3</sup>, Micheal Day<sup>4</sup>,  
Simon Tappin<sup>5</sup>, Ben Harris<sup>6</sup>, Ian Battersby<sup>7</sup>,  
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1 Department of Veterinary Medicine and Science, University of Nottingham, Nottingham, United Kingdom

2 Willows Veterinary Centre and Referral Service, Solihull, West Midlands, United Kingdom

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4 Bristol Veterinary School, University of Bristol, Langford House, Bristol, United Kingdom

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6 Northwest Veterinary Specialists, Delamere House, Ashville Point, Sutton Weaver, Cheshire, United Kingdom

7 Davies Veterinary Specialists, Manor Farm Business Park, Hitchin, Hertfordshire, United Kingdom

8 Anderson Moores Veterinary Specialists, Bunstead Barns, Poles Lane, Hursley, Winchester, United Kingdom

## OBJECTIVES

To describe the history, clinicopathological abnormalities, diagnostic imaging findings, lymph node cytological/

histological appearance, treatment and outcome of English Springer Spaniels (ESS) diagnosed with idiopathic sterile steroid-responsive lymphadenitis (SSRL).

## METHODS

In this retrospective UK-based multicentre study, 64 cases were recruited from ten referral centres, twenty-two first-opinion practices and three histopathology/clinical pathology laboratories, between 2010 and 2016.

## RESULTS

The median age at presentation was 6 years (range: 0.17–11.75 years). Neutered females were over-represented. Pyrexia (83.8%), peripheral lymphadenopathy (78.4%), dermatological lesions (72.9%), lethargy (67.6%), hyporexia (54%), epistaxis, sneezing or nasal discharge (21.6%), diarrhoea (29.7%), coughing (24.3%), ocular signs (21.6%) and vomiting (16.2%) were reported in dogs for which the history and physical examination records were available. Popliteal (50%), prescapular (42.9%), and submandibular (41.1%) lymphadenopathy was frequently reported. Haematology and biochemistry revealed non-specific changes. When performed, testing for infectious diseases was negative in all cases. Lymph node cytology and/or histology demonstrated mainly mixed inflammatory (27%), pyogranulomatous (24%), neutrophilic/suppurative (20%), or granulomatous (11%) lymphadenitis. Treatment details were available for 38 dogs, with 34 receiving prednisolone (mean starting dose: 2 mg/kg/day). A variety of other supportive treatments were used. Mean duration of prednisolone therapy was 15 weeks (range: 1–28 weeks). A good to excellent clinical response was reported in all dogs receiving prednisolone but one. Ten cases relapsed after discontinuing prednisolone.

## STATEMENT (CONCLUSIONS)

Idiopathic SSRL should be considered as a differential diagnosis for lymphadenopathy and pyrexia in ESS. The disease characteristics, lack of an identifiable underlying cause, and response to corticosteroids may suggest an immune-mediated aetiology.

# Feline bone marrow aspiration: triggers for sampling and disease prevalence

**Alba Maldonado-Moreno<sup>1</sup>, Paola Monti<sup>1</sup>,  
Paolo Silvestrini<sup>2</sup>, Rachel Miller<sup>1</sup>**

<sup>1</sup> Dick White Referrals, Six Mile Bottom, United Kingdom

<sup>2</sup> University of Liverpool, Liverpool, United Kingdom

## OBJECTIVES

To determine the clinical settings that lead to bone marrow (BM) aspiration in cats and the prevalence of BM disease according to the initial reason for sampling.

## METHODS

The records of all feline patients undergoing BM examination were retrospectively reviewed. Identified cases were classified into 6 categories based on the reason for the procedure: anaemia, bicytopenia, pancytopenia, neutropenia, tumour staging and other triggers. The final diagnosis was recorded for each patient.

## RESULTS

A total of 93 patients were identified and included in the study. Triggers for BM aspiration included: anaemia (35), bicytopenia (27), pancytopenia (13), neutropenia (8), and tumour staging (7), circulating eosinophilia (1), suspected BM suppression secondary to chemotherapy (1), and thrombocytopenia (1).

No significant BM abnormalities were found in 20 cases from all categories: anaemia (6) group, bicytopenia (4), pancytopenia (1), neutropenia (3), tumour staging (4) and others (2).

Non-regenerative immune-mediated haemolytic anaemia (NR-IMHA) was the most commonly identified disease in the anaemia (23/35), bicytopenia (11/27) and pancytopenia (8/13) groups. In the neutropenic group, immune-mediated neutropenia was most common, diagnosed in 5/8 cats. In the tumour staging group 1 cat had a normal BM, one was diagnosed with multiple myeloma and 1 with neoplastic mast cell infiltration.

## STATEMENT (CONCLUSIONS)

Anaemia and bicytopenia were the most common triggers for BM sampling in cats. Non-regenerative IMHA was the most prevalent disease identified in this study population accounting for 42/93 patients and accounting for 65% and 40% of anaemic and bicytopenic cats respectively.

# Proteinuria in canine non-erosive immune mediated polyarthritis

**Lucy Barker, Sophie Adamantos,  
Simon McManus, Vicki Black**

University of Bristol, Bristol, United Kingdom

## OBJECTIVES

To evaluate the point prevalence of proteinuria and assess for association with risk of relapse in dogs with primary non-erosive immune-mediated polyarthritis.

## METHODS

Single-centre retrospective referral-based study. The hospital database was searched for dogs with a diagnosis of primary non-erosive immune-mediated polyarthritis and concurrent urinalysis between January 2009 and August 2018. Data analysed included signalment, investigation findings, treatment and long-term follow-up including repeat UPC results. Dogs were defined as either non-proteinuric (UPC <0.2), borderline-proteinuric (UPC 0.2–0.5), or overtly-proteinuric (UPC > 0.5). Within

the overt proteinuria group those with UPC >2 were defined as markedly-proteinuric. Statistical analysis was undertaken using point prevalence and Chi-squared test to assess presence of proteinuria and whether marked proteinuria was associated with an increased risk of relapse respectively.

## RESULTS

Fifty-eight dogs were eligible for inclusion. Twenty-eight dogs (48%) were non-proteinuric, 8 dogs (14%) were borderline proteinuric and 22 dogs (37%) were overtly proteinuric. Marked proteinuria was present in 12 dogs (20%). Repeated urinalysis was performed in 9/12 dogs with marked proteinuria, 7/9 (77%) had improvement to a UPC <1.2 (median 0.46, range 0.1–1.2) within 1 month, in four of these dogs improvement was documented despite treatment with prednisolone. There was no association between the presence of marked proteinuria and risk of relapse of clinical signs ( $p = 0.35$ ).

## STATEMENT (CONCLUSIONS)

Proteinuria, including marked proteinuria, was common in this cohort of dogs diagnosed with primary non-erosive immune-mediated polyarthritis, and was not associated with increased risk of relapse of clinical signs. Presence of proteinuria did not appear to preclude prednisolone therapy.



Saturday 6 April  
Bolton Room

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# Haematology & immunology

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- 474 16:50–17:05  
**Incidence of microcytosis in hyperthyroid cats referred for radioiodine treatment**  
Claudia Gil Morales
- 474 17:05–17:20  
**Urinary thromboxanes are increased in dogs with IMHA**  
Elizabeth Conway
- 475 17:20–17:35  
**Immune-mediated polyarthritis in fourteen cats (2009–2018)**  
Florence Wootton
- 475 17:35–17:50  
**Does duration of clinical signs prior to diagnosis affect outcome in dogs with immune-mediated polyarthritis**  
Simon Mcmanus
- 476 17:50–18:05  
**Evaluation of alterations in mean platelet volume in dogs with pancreatitis**  
Pak Kan Tang

## Oral presentations

# Incidence of microcytosis in hyperthyroid cats referred for radioiodine treatment

**Claudia Gil Morales<sup>1</sup>, Angie Hibbert<sup>2</sup>,  
Marta Costa<sup>1,3</sup>, Kathleen Tennant<sup>3</sup>**

- 1 School of Veterinary Sciences, University of Bristol, Bristol, United Kingdom
- 2 The Feline Centre, Langford Veterinary Services, Bristol, United Kingdom
- 3 Langford Veterinary Diagnostic Lab, Langford Veterinary Services, Bristol, United Kingdom

## OBJECTIVES

To document the incidence of erythrocyte microcytosis in a population of hyperthyroid cats referred for radioiodine (RAI) treatment. Microcytosis has been observed but not described in feline hyperthyroid patients; in humans it is associated with hyperthyroidism.

## METHODS

Retrospective clinicopathological data were collected for cats undergoing RAI between January and December 2017. Microcytosis was defined as mean corpuscular volume (MCV).

## RESULTS

There were 41 female and 37 male cats; age range 7.2–20.8 years. Most were non-pedigree (98.7%). Microcytosis (median MCV 39.3 fL, interquartile range 32.3–41.2) was present in 41% (32/78) of the cats; 1/32 pre-RAI, 9/32 post-RAI and 22/32 pre- and post-RAI. Of the 54 microcytic samples, 85.2% were confirmed as microcytic on smear examination. Of mildly, moderately and severely hyperthyroid cats, 36% (9/25), 37.5% (12/32) and 55% (11/20) were microcytic respectively. Two microcytic cats had low red blood cell counts ( $<6 \times 10^{12}/L$ ). There was no correlation between TT4 and MCV. Microcytosis resolved in 63.6% (7/11) cases with follow-up. Two microcytic cats had comorbidities (portosystemic shunt; triaditis).

## STATEMENT (CONCLUSIONS)

Microcytosis was present in a significant proportion of hyperthyroid cats, most without significant comorbidities, and resolved in some following RAI.

# Urinary thromboxanes are increased in dogs with IMHA

**Elizabeth Conway, Neil P. Evans,  
Alison E. Ridyard**

University of Glasgow, Glasgow, United Kingdom

## OBJECTIVES

Thromboembolic disease is a significant cause of mortality in dogs with immune-mediated haemolytic anaemia (IMHA), but determining which patients are at risk of thrombosis is problematic. A biomarker to predict thrombotic risk would allow individualisation of therapy. Thromboxane- $A_2$ , produced by both platelets and the vascular endothelium, is a potent platelet activator and may be involved in the pathogenesis of thrombosis in IMHA. Thromboxane- $A_2$  has a short half-life in plasma, being spontaneously converted to more stable metabolites 11-dehydro-thromboxane  $B_2$  (11-dTXB $_2$ ) and 2,3-dinor-11-dehydro-TxB $_2$ , which are excreted in urine. An 11-dTXB $_2$  ELISA has previously been validated in canine urine. The aim of this study was to compare urinary

11-dTXB $_2$  levels between healthy dogs and dogs with IMHA, with the hypothesis that dogs with IMHA are pro-thrombotic, and will have higher 11-dTXB $_2$  levels.

## METHODS

Free-catch urine samples were collected from healthy dogs ( $n = 8$ ), and newly diagnosed IMHA patients ( $n = 10$ ). Samples were frozen at  $-80^\circ C$  until batch analysis. Urinary 11-dTXB $_2$  was measured using a commercially available monoclonal ELISA (Cayman Chemicals, Ann Arbor, MI, USA) and expressed relative to urine creatinine (mg). Normality of the data was assessed using a Shapiro-Wilk test and results compared between groups using a T-test.

## RESULTS

Dogs with IMHA had significantly higher urinary 11-dTXB $_2$  levels ( $3.11 \pm 1.61$  ng/mg creatinine, range 0.97–5.91) than healthy controls ( $0.68 \pm 0.30$  ng/mg creatinine, range 0.29–1.32) ( $p = 0.01$ ).

## STATEMENT (CONCLUSIONS)

Dogs with IMHA have increased urinary 11-dTXB $_2$  consistent with heightened thromboxane- $A_2$  production. Further studies correlating 11-dTXB $_2$  levels with clinical outcome measures such as incidence of thrombosis and mortality are warranted.

# Immune-mediated polyarthritis in fourteen cats (2009–2018)

**Florence Wootton<sup>1</sup>, Sorrel Langley-Hobbs<sup>1</sup>,  
Fiona Whitworth<sup>1</sup>, Anna Threlfall<sup>2</sup>,  
Thomas Anderson<sup>3</sup>, Craig Breheny<sup>4</sup>,  
Vicki Black<sup>1</sup>**

- 1 Bristol Vet School, Bristol, United Kingdom
- 2 Davies Veterinary Specialists, Higham Gobion, United Kingdom
- 3 Dick White Referrals, Six Mile Bottom, United Kingdom
- 4 Edinburgh University, Edinburgh, United Kingdom

## OBJECTIVES

To describe the clinical features and outcome in cats with non-erosive immune-mediated polyarthritis.

## METHODS

Multicentre retrospective case series. Cats with non-erosive immune-mediated polyarthritis were identified by searching five hospital databases between 2009 and 2018. Data including signalment, history, investigation findings including presence of a trigger and category (infectious,

gastrointestinal, or neoplastic), and treatment was analysed. Referring vets were contacted for follow-up.

## RESULTS

Fourteen cases were identified; there was no obvious sex predisposition (7 MN, 2 ME, 5 FN), median age was 8.5 years (range 1–14 years), and most common breeds were domestic shorthairs (7) and Maine coons (3). Common clinical signs included lameness (14/14) and pyrexia (6/12). In half of the cases (7/14) a trigger was identified; this was considered to be infectious in four cats (FIV 2/4, infectious discospondylitis 1/4, pneumonia 1/4) and gastrointestinal in three cats.

Ten cats received immunosuppressive therapy (prednisolone 8/10, ciclosporin 1/10, prednisolone and chlorambucil 1/10). In four cats adjunctive immunosuppressants were later instituted (chlorambucil 3/4, ciclosporin 1/4) due to poor response (2/4) or side-effects (2/4). The four cats considered to have an infectious trigger received anti-inflammatories +/- antimicrobials. At short-term follow-up four cases were euthanased due to poor response (3/4) or drug side-effects (1/4).

## STATEMENT (CONCLUSIONS)

Pyrexia is not a consistent feature in cats with immune-mediated polyarthritis and a trigger, specifically infectious or gastrointestinal disease should be considered. Prognosis appears fair, some cats experienced drug side-effects or had a poor response to immunosuppressive monotherapy.

# Does duration of clinical signs prior to diagnosis affect outcome in dogs with immune-mediated polyarthritis

**Simon Mcmanus, Lucy Barker,  
Sophie Adamantos, Vicki Black**

University of Bristol, Bristol, United Kingdom

## OBJECTIVES

To explore outcome in dogs diagnosed with primary non-erosive immune-mediated polyarthritis and to evaluate whether duration of clinical signs for more than 30 days prior to diagnosis affects risk of relapse.

## METHODS

Retrospective single referral-centre study. The hospital database was searched January 2009 to August 2018 for

dogs with a diagnosis of idiopathic non-erosive IMPA. Data extracted included signalment, duration of clinical signs, outcome and relapse episodes. Long-term follow-up was achieved by contacting referring veterinary practices. Data was recorded descriptively and categorised. A Chi squared test was used to assess whether clinical signs of >30 days duration prior to diagnosis was associated with a risk of relapse.

## RESULTS

One hundred and one dogs were identified. Long-term follow-up was available for 75 dogs. Median age at diagnosis was 4.49 years (range 0.38–11.02 years). Median duration of clinical signs was 30 (range 1–632) days, 37/75 cases (49%) relapsed, with a median relapse time of 119 (range 3–1410) days after diagnosis. There was no association between duration of clinical signs and risk of relapses ( $p = 0.54$ ). Fifty-six dogs were alive at the time of follow-up, 12/19 (63%) died or were euthanised as a result of their disease.

## STATEMENT (CONCLUSIONS)

Long-term prognosis in this cohort of dogs with primary non-erosive immune-mediated polyarthritis was fair, with a high risk of relapse (49%) and death due to disease (16%). Although duration of signs prior to diagnosis was highly variable, this was not associated with risk of relapse.

# Evaluation of alterations in mean platelet volume in dogs with pancreatitis

**Pak Kan Tang, Carlos Martinez,  
Emma O'Neill, Robert E. Shiel**

School of Veterinary Medicine, University College Dublin,  
Dublin, Ireland

## OBJECTIVES

To evaluate mean platelet volume (MPV), an indicator of platelet activation and aggregation, in dogs with pancreatitis.

## METHODS

Dogs with pancreatitis (acute or chronic) or inflammatory bowel disease (IBD) and healthy controls were identified retrospectively within the hospital database. The MPV, measured using the ADVIA 2120 (Siemens), was documented in each case. A diagnosis of pancreatitis was based upon presence of consistent clinical signs (vomiting, inappetence or cranial abdominal discomfort) combined with canine pancreatic lipase concentration

$\geq 400$   $\mu\text{g/L}$  or abdominal ultrasonographic findings supportive of pancreatitis, or both. Cases were excluded if concurrent immune-mediated thrombocytopenia, immune-mediated haemolytic anaemia or thromboembolic disease was diagnosed. Showing non-parametric data distribution, the results are reported as median (interquartile range) and Kruskal-Wallis ANOVA with Dunn post-test used to compare groups.

## RESULTS

In 52 dogs with pancreatitis and 42 dogs with IBD, the MPV (13.7fL (11.9–15.4)) and (12.2fL (10.9–13.9)) were significantly higher compared to 79 healthy controls (11.2fL (10.0–12.2)) and ( $p < 0.0001$  and  $p = 0.0104$ , respectively). However, there was no significant difference between pancreatitis and IBD groups ( $p = 0.074$ ). When comparing pancreatitis and healthy groups, an optimal cut-off of 13.65fL yielded a sensitivity and specificity of 53.8% and 91.1% respectively; the area under ROC curve (AUC) was 0.795. When pancreatitis and IBD groups were compared, a cut-off value of 13.5fL yielded a sensitivity and specificity of 53.5% and 73.8%, respectively; the AUC was 0.639.

## STATEMENT (CONCLUSIONS)

MPV is higher in dogs with pancreatitis compared to healthy controls; however, the extensive overlap between dogs with pancreatitis and gastrointestinal disease limits its diagnostic value in dogs.



Thursday 4 April  
Telford Room

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# Canine general practice & feline general practice

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- 478 08:30–08:45  
**Boxing clever: unravelling Boxer dog health in the UK using primary-care veterinary records**  
Kate Barrett
- 478 08:45–09:00  
**Clinical usage of gabapentin in dogs under primary veterinary care in the UK**  
Lavinia F Mitton
- 479 09:00–09:15  
**Getting under the skin of West Highland White Terriers using primary practice clinical data**  
Zoie F. Ballantyne
- 479 09:15–09:30  
**Factors associated with owner acquisition of puppies under 8 weeks of age**  
Rachel H Kinsman
- 480 09:30–09:45  
**Identifying disorders of greatest importance to Staffordshire Bull Terriers under veterinary care**  
Holly Roberts
- 480 09:45–10:00  
**What factors influence the development and outcome of Gastric dilatation and volvulus (GD/GDV) in Greyhounds?**  
Sarah Dolbear
- 481 11:05–11:20  
**Effect of dog ownership experience on the uptake of preventative health care practices reported by puppy owners**  
Emma Buckland
- 481 11:20–11:35  
**Retrospective analysis of Canine Bronchoalveolar Lavage submissions to referral veterinary laboratories in the UK**  
Guy Davies
- 482 11:35–11:50  
**Core outcomes in feline chronic kidney disease: what should we be measuring?**  
Hannah Doit
- 482 11:50–12:05  
**A cat and mouth game: investigation of odontoclast dysregulation in feline tooth resorption**  
Nicola Mawson

## Oral presentations

# Boxing clever: unravelling Boxer dog health in the UK using primary-care veterinary records

**Kate Barrett, Dave C. Brodbelt, David B. Church, Dan G. O'Neill**

Royal Veterinary College, Hertfordshire, United Kingdom

## OBJECTIVES

The Boxer dog is reportedly predisposed to many disorders but these reports (often decades-old or non-UK) generalize to the current UK Boxer dog population.

## METHODS

Demographic, disorder and mortality data were extracted from VetCompass™ anonymized clinical records on Boxer dogs under UK primary veterinary care during 2016. We hypothesized 'the prevalence of ulcerative

keratitis is higher in Boxer dogs aged  $\geq 6$  years than in those aged  $< 6$  years'.

## RESULTS

This study comprised 3219 Boxer dogs (0.96% of all dogs). Median age was 5.81 years (IQR 3.10–8.79, range 0.18–18.37). Median adult bodyweight was 29.9 kg (IQR 26.3–33.9, range 15.1–52.5); males were heavier (32.4 kg, IQR 29.3–36.5) than females (27.0 kg, IQR 24.4–30.3) ( $p < 0.001$ ).

The most common disorders were otitis externa (7.14%, 95% CI: 6.31–8.09), epulis (5.84%, 95% CI: 5.08–6.70) and ulcerative keratitis (5.00%, 95% CI: 4.30–5.81).

Boxer dogs aged  $\geq 6$  years had 13.6 times the odds of ulcerative keratitis (95% CI: 7.5–24.7 and  $p < 0.001$ ) compared with those aged  $< 6$  years.

Median longevity of 346 Boxer dog deaths was 10.57 years (IQR 8.90–12.19, range 1.02–18.37). The most common grouped causes of death were neoplasia (15.8%, 95% CI: 11.91–20.54), brain disorder (12.1%, 95% CI: 8.74–16.49) and mass lesions (10.6%, 95% CI: 7.50–14.84).

## STATEMENT (CONCLUSIONS)

We identified and distinguished common disorders, e.g. otitis externa, from predisposed disorders, e.g. epulis and ulcerative keratitis (increasing predisposition over 6 years old) in the current UK general Boxer dog population. This perspective can assist veterinarians to prioritise their treatments and advisory activities.

# Clinical usage of gabapentin in dogs under primary veterinary care in the UK

**Lavinia F Mitton, Sandra Sanchis-Mora, Ludovic Pelligand, Holger Volk, David C Brodbelt, Dan G O'Neill**

Royal Veterinary College, Hertfordshire, United Kingdom

## OBJECTIVES

This retrospective study aimed to explore gabapentin use in dogs in the UK. We aimed to report usage prevalence, conditions treated, therapeutic effectiveness, treatment duration and dose regimens, suspected adverse reactions and accompanying treatments.

## METHODS

The study included 318,922 dogs within the VetCompass™ Program under primary veterinary care in 2016. Data were collected from anonymised electronic medical records.

## RESULTS

Usage prevalence of gabapentin was 0.44% (95% CI: 0.42–0.47%;  $n = 1415$ ). Twenty condition types were treated including: spinal pain and/or lesion (31.7%), pain – musculoskeletal (23.9%), osteoarthritis (13.2%), Chiari-like malformation/syringomyelia (4.7%), intervertebral disc disease (4.3%), unspecified neuromuscular signs (4.0%), unspecified pain (3.8%), cruciate disease (2.7%) and seizure(s) (1.9%). Gabapentin was reported to improve clinical signs in 47.3% of dogs. The course duration was generally short term (59.7%;  $< 30$  days between first and last dispense) and 59.6% of doses were given twice daily. The prevalence of suspected adverse reactions was 7.85% (95% CI: 6.57–9.36%;  $n = 1438$ ) and the most common were sedation (5.2%) and ataxia (1.3%). The most common accompanying treatments alongside gabapentin were non-steroidal anti-inflammatory drugs (27.2%), tramadol (9.0%), glucocorticoids (5.6%) and opioids (4.8%).

## STATEMENT (CONCLUSIONS)

This study provides useful benchmarking data on gabapentin usage in primary-care practice and suggests a low occurrence of mild side effects. Despite the subjective nature of the efficacy assessment, gabapentin showed a good therapeutic efficacy. These results can assist practicing clinicians to benchmark their clinical use of gabapentin and to predict suspected adverse reactions.

# Getting under the skin of West Highland White Terriers using primary practice clinical data

**Zoie F. Ballantyne, Dave C. Brodbelt,  
David B. Church, Dan G. O'Neill**

Royal Veterinary College, Hertfordshire, United Kingdom

## OBJECTIVES

West Highland White Terriers (WHWT) are often considered by veterinarians as 'the itchy/scratchy breed' but little prevalence exists on their overall health. This study aimed to report demography, mortality and common disorders in WHWTs under UK primary veterinary care and to explore co-morbid disorder associations with otitis externa (OE).

## METHODS

Demographic, mortality and disorder data for the year 2016 were extracted from VetCompass™ de-identified patient records.

## RESULTS

This study included 2053 WHWTs. Median age was 7.8 years (IQR 4.3–11.1). Of 164 deaths recorded, the median longevity was 13.4 years (IQR 11.0–15.0). The most commonly recorded causes of death were lower respiratory tract disorder (10.2%, 95% CI 4.9–15.4), neoplasia (10.2%, 95% CI 4.9–15.4) and spinal cord disorder 7.8% (95% CI 3.2–12.5). The most common specific disorders were periodontal disease (15.7%, 95% CI 14.1–17.3), OE (10.6%, 95% CI 9.3–11.9), overgrown nails (7.2%, 95% CI 6.1–8.4), hypersensitivity (allergic) skin disorder (6.5%, 95% CI 5.4–7.6%) and obesity (6.1%, 95% CI 5.1–7.2%). Of the top 20 disorders, no non-epidermal disorders were co-morbidly associated with OE while 3 of the 10 epidermal disorders (pododermatitis, pyoderma and dermatitis) were associated with OE.

## STATEMENT (CONCLUSIONS)

Compared with other common breeds, WHWTs were heavily over-represented for skin disease. High comorbidity between skin diseases suggests common underlying aetiopathogenesis pathways that may offer opportunities to control several skin conditions simultaneously. High mortality due to lower respiratory tract disease suggests that clinical focus should be placed on respiratory function in older WHWTs.

# Factors associated with owner acquisition of puppies under 8 weeks of age

**Rachel H Kinsman<sup>1</sup>, Rachel Casey<sup>1</sup>,  
Michelle Lord<sup>1</sup>, Joshua Woodward<sup>1</sup>,  
Séverine Tasker<sup>2,3</sup>, Toby Knowles<sup>2</sup>,  
Rosa Da Costa<sup>1</sup>, Jane Murray<sup>1</sup>**

- 1 Dogs Trust, London, United Kingdom
- 2 University of Bristol, Bristol, United Kingdom
- 3 Linnaeus Group, Shirley, United Kingdom

## OBJECTIVES

To identify owner- and dog-related risk factors associated with acquisition of puppies under the recommended age of 8 weeks.

## METHODS

The owner-reported data used in this analysis were collected from online questionnaires completed by puppy

owners living in the UK and ROI who registered puppies <16 weeks of age into a longitudinal study.

Multivariable logistic regression was used to test for associations between acquisition at <8 weeks of age and potential explanatory variables (including breed (specific named/mixed/unknown), source of puppy, whether puppies were viewed with mother and/or father, previous dog ownership and number of times the puppy was viewed before acquisition).

## RESULTS

Excluding home-bred puppies, 26.5% (423/1597) were acquired <8 weeks of age. Two variables were retained in the model:

1. Owners who had owned other dogs during adulthood were more likely to acquire puppies <8 weeks old, compared with 'first time owners' or those 'who had a family dog as a child but not subsequently' (OR = 1.45, 95%CI 1.09–1.92,  $P < 0.010$ )
2. owners who visited their puppy at least once before acquisition were more likely to obtain puppies <8 weeks old, compared with owners who did not see their puppy before acquisition (OR = 1.74, 95%CI 1.34–2.27,  $P < 0.001$ )

## STATEMENT (CONCLUSIONS)

Advice regarding minimum acquisition age was not followed by 26.5% of this cohort, particularly those with

## Oral presentations

previous dog ownership experience. Future research within this longitudinal study will investigate the influence acquisition age has on various health/behaviour

outcomes, with the potential to provide evidence for puppy purchasing recommendations regarding minimum age at acquisition.

# Identifying disorders of greatest importance to Staffordshire Bull Terriers under veterinary care

**Holly Roberts, Dave C Brodbelt,  
David B Church, Dan G O'Neill**

RVC, Hertfordshire, United Kingdom

## OBJECTIVES

Staffordshire Bull Terriers (SBT) are a common UK dog breed, but reliable and generalisable health data are limited. This study aimed to report demography, mortality and common disorders in SBTs under first-opinion veterinary care in the UK during 2016, with a special focus on obesity.

## METHODS

Signalment, diagnosis and mortality information were extracted from anonymised VetCompass™ clinical records. A cross-sectional analysis was used to report

the 1-year period prevalence of the most commonly diagnosed disorders.

## RESULTS

The study included 20,837 (6.19%) SBTs from 336,865 dogs overall. Adult bodyweight of males (median 21.5 kg, IQR 19.1–24.0) was heavier than females (18.6 kg, IQR 16.5–21.0) ( $p < 0.001$ ). Median longevity was 12.0 years (range 0.60–19.82). The most common causes of death were neoplasia ( $n = 34$ , 16.66%) and mass-associated lesion ( $n = 23$ , 11.27%).

The most prevalent disorders overall were overgrown nail(s) ( $n = 216$ , 6.67%, 95% CI: 4.66–7.53), overweight/obesity (176, 5.44%, 95% CI: 4.48–6.02), periodontal disease (170, 5.25%, 95% CI: 4.4–5.92), otitis externa (167, 5.16%, 95% CI: 4.29–5.79) and skin (cutaneous) disorder (163, 5.04%, 95% CI: 4.29–5.79).

Female SBTs had 1.5 times the odds of overweight/obese than males. SBTs aged 10 years and over were over twice as likely to be diagnosed as overweight/obese as dogs aged below 10.

## STATEMENT (CONCLUSIONS)

This presentation will discuss the most common disorders of SBTs and explore how this information can be used to prioritise health management in the breed. The results will provide veterinarians with a solid evidence-base when advising owners on clinical and lifestyle decisions for their SBT.

# What factors influence the development and outcome of Gastric dilatation and volvulus (GD/GDV) in Greyhounds?

**Sarah Dolbear<sup>1</sup>, Mark Dunning<sup>2,1</sup>**

- 1 University of Nottingham, School of Veterinary Medicine and Science, Nottingham, United Kingdom
- 2 Willows Veterinary Centre and Referral Service, Solihull, United Kingdom

## OBJECTIVES

Greyhounds appear anecdotally to be at an increased risk of developing GD/GDV. Little specific research has been conducted into particular factors influencing the onset of GD/GDV in the breed. This study aimed to identify epidemiological characteristics that influence the development and outcome of GD/GDV in Greyhounds.

## METHODS

A survey containing multiple choice and free text questions was constructed and distributed to Greyhound owners in person and via email. Microsoft Excel was used for descriptive and inferential statistics.

## RESULTS

Data was available for 83 Greyhounds, of which 19 suffered from GD/GDV. Significantly, 14 (78%) of the dogs which

suffered a GD/GDV episode were fed from a height compared with 27 (53%) unaffected dogs ( $p = 0.032$ ). Significantly, a larger proportion of the dogs which suffered from GD/GDV suffered from borborygmi ( $p = 0.037$ ). Seven Greyhound owners reported their dogs undergoing previous abdominal surgery, 6 of these went on to develop GD/GDV ( $p = 0.0001$ ). Six (38%) Greyhounds suffering a GD/GDV had a relative which suffered from the condition compared with 5 (24%) dogs which did not suffer bloat ( $p = 0.026$ ). Twelve (86%) dogs undergoing surgery for the GD/GDV survived and 9 (75%) were subsequently discharged.

## STATEMENT (CONCLUSIONS)

This study indicates that feeding from a height, presence of borborygmi, having an affected relative and previous abdominal surgery could be important factors influencing the development of GD/GDV in Greyhounds. This information may be valuable for Greyhound owners attempting to minimise the chances of their dogs developing GD/GDV.

# Effect of dog ownership experience on the uptake of preventative health care practices reported by puppy owners

**Emma Buckland<sup>1</sup>, Rosa Da Costa<sup>1</sup>,  
Rachel Casey<sup>1</sup>, Michelle Lord<sup>1</sup>,  
Rachel Kinsman<sup>1</sup>, Joshua Woodward<sup>1</sup>,  
S  verine Tasker<sup>2,3</sup>, Toby Knowles<sup>2</sup>,  
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<sup>3</sup> Linnaeus Group, Shirley, United Kingdom

## OBJECTIVES

To summarise preventative health care practices reported by owners of puppies aged  $\leq 16$  weeks, and to determine whether previous dog ownership affected engagement in preventative health care.

## METHODS

Owners who acquired a single puppy at  $\leq 11.5$  weeks of age and lived in the UK or Republic of Ireland were recruited onto a longitudinal cohort study. Online questionnaires were completed at study registration and when puppies were aged 16 weeks. Chi-squared tests were used to examine associations between previous dog ownership and the use of flea and worm treatment/preventative products, vaccinations and pet insurance, on puppies at or before 16 weeks of age.

## RESULTS

Of 1,288 owners, 1,118 (87%) and 1,230 (95%) reported that by 16 weeks of age their puppies had been administered at least one flea product and at least one worming product, respectively; 1,259 (98%) of puppies had been vaccinated at least once and 1,066 (83%) were insured by 16 weeks.

First-time puppy owners were more likely than owners with previous dog ownership experience to use a flea product (OR: 2.63; 95%CI: 1.66–4.16;  $P < 0.001$ ) and have pet insurance (OR: 1.92; 95%CI: 1.33–2.79;  $P < 0.001$ ) by 16 weeks of age, respectively. No differences were found for the use of worming products ( $P = 0.3$ ) nor vaccinations by 16 weeks of age ( $P = 0.2$ ).

## STATEMENT (CONCLUSIONS)

Flea product use and pet insurance acquisition were less commonly reported than worming product use and vaccination amongst our cohort subjects. Factors, including previous dog ownership, may influence uptake of preventative health care, suggesting advice could be tailored to different audiences.

# Retrospective analysis of Canine Bronchoalveolar Lavage submissions to referral veterinary laboratories in the UK

**Guy Davies<sup>1,2</sup>, Rand Wilson<sup>2</sup>,  
Peter Graham<sup>1</sup>**

<sup>1</sup> School of Veterinary Medicine and Science,  
University of Nottingham, Nottingham,  
United Kingdom

<sup>2</sup> Finn Pathologists, Norfolk, United Kingdom

## OBJECTIVES

The aim of this study was to investigate the prevalence of bacterial respiratory disease in dogs using the results of canine bronchoalveolar lavage (BAL) submissions.

# Oral presentations

## METHODS

A retrospective epidemiological study was performed on the results of canine BAL submissions to three referral veterinary laboratories between July 2013 and July 2018. Data on signalment, microbial culture, and cytological findings were collected. Cases were excluded if insufficient information was available. Data was collated using Microsoft Excel and descriptive statistics were performed using GraphPad Prism.

## RESULTS

2501 cases were collected from a 5 year period. Cases ranged in age from 1 to 17 years with a mean age of 7.87 years. 1735 (69%) of those cases had microbial culture performed, with 767 yielding a positive culture. 405 cases

(16.2%) had a cytological diagnosis of neutrophilic inflammation with sepsis, 237 of which had a concurrent positive microbial culture result. 1100 cases had findings of neutrophilic inflammation with no overt signs of sepsis found. *Bordetella* spp., Beta haemolytic *Streptococcus*, Coagulase-positive *Staphylococcus*, Coliform spp., and *Pasteurella* spp. were the most frequent bacterial species isolated in cases of sepsis. Oropharyngeal contamination was found in 308 submissions, and 315 proved non-diagnostic. There was no significant difference in age or sex between disease groups.

## STATEMENT (CONCLUSIONS)

Bacterial infection of the lower respiratory tract is a frequent finding, more commonly made via cytological signs of sepsis, rather than microbial culture.

# Core outcomes in feline Chronic Kidney Disease: what should we be measuring?

**Hannah Doit<sup>1</sup>, Marnie Brennan<sup>1</sup>,  
Rachel Dean<sup>2</sup>, Marco Duz<sup>1</sup>,  
Richard Emes<sup>1</sup>**

1 University of Nottingham, Nottingham, United Kingdom  
2 VetPartners, York, United Kingdom

## OBJECTIVES

Over 100 different parameters are measured in the published treatment efficacy studies for cats with Chronic Kidney Disease (CKD), making it impossible to compare or combine the results of studies. Developing an agreed Core Outcome Set (COS) would resolve some of the issues as all future studies can use these when assessing treatment efficacy. The overall aim of this study was to create a COS for CKD in cats.

## METHODS

Using a Delphi methodology, an anonymous, international panel of 73 stakeholders, including clinical experts, journal editors, regulatory agencies and cat owners, completed a series of online questionnaires to build consensus on the most important parameters to measure when treating cats with CKD. They were asked to rate the importance of parameters using Likert scales (1–9). Consensus was defined a priori as 80% of participants rating the parameter as 8 or 9. The study contained 3 rounds in total.

## RESULTS

Response rate was between 78 and 95% across the first questionnaires, with 14 parameters reaching consensus for inclusion within the first round of the study. These included specific parameters from urine and serum tests, quality of life, survival time/renal survival end-point, IRIS stage and clinical examination.

## STATEMENT (CONCLUSIONS)

This research highlights the outcomes which all stakeholders consider important when making treatment decisions for cats with CKD. Including this COS in future clinical trials will ensure results will be relevant to both first opinion and referral practice, strengthening the evidence base available for decision making.

# A cat and mouth game: Investigation of odontoclast dysregulation in feline tooth resorption

**Nicola Mawson, Seungmee Lee, Professor  
Colin Farquharson, Dr Gurå Bergkvist**

The Royal (Dick) School of Veterinary Studies and the Roslin Institute, Edinburgh, United Kingdom

## OBJECTIVES

Feline tooth resorption (TR) is a painful and progressive clinical condition that affects at least 30% of adult cats. Recently, a RNA sequencing study (unpublished data)

identified >1000 differentially expressed (DE) genes between TR negative (TR-) and TR positive (TR+) teeth. Many of the DE genes were involved in pathways relating to TR, odontoclast differentiation, and tooth remodeling processes. From this data, six genes (MMP9, P2XR4, SPI.1, OPG, RANK, RANKL) were chosen for closer inspection. The objectives of this study were: 1. To confirm if these six genes are truly differentially expressed between TR+ and TR- teeth, and 2. To localize protein expression from these genes in feline dental tissues.

## METHODS

A case-control study was conducted on feline teeth collected from clinical samples and at post mortem with owner consent. Quantitative-PCR using the delta-delta method was used to validate the selected genes, followed by immunohistochemical staining to label the proteins in tissue samples. H&E-stained tooth sections

were also evaluated to investigate the histological features of TR+ teeth.

## RESULTS

Quantitative-PCR analysis revealed increased MMP9 and P2XR4 expression in TR+ teeth. The RANKL/OPG expression ratio did not change significantly between paired teeth. H&E and immunohistochemical staining of feline tooth sections identified the presence of odontoclasts, strong MMP9 expression, and ankylosis at sites of TR.

## STATEMENT (CONCLUSIONS)

Identification of specific genetic factors involved in feline tooth resorption could have important implications for the development of therapeutic treatments for the condition.





Thursday 4 April  
Telford Room

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# Diagnostic imaging, nutrition & other

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- 486 13:35–13:50  
**The use of contrast-enhanced computed tomography for the diagnosis of hiatal hernia in brachycephalic dogs suffering from the Brachycephalic Obstructive Airway Syndrome (BOAS)**  
Olivia Oginska
- 486 13:50–14:05  
**Computed tomographic and surgical findings of retained surgical sponges in two dogs**  
Kyriakos Chatzimisios
- 487 14:05–14:20  
**Duplex and compressibility ultrasound examination in canine thoracic limb**  
Joanna Lodzinska
- 487 14:35–14:50  
**Retrospective evaluation of dietary management in glycaemic stabilisation and cataract formation in 152 dogs with diabetes mellitus**  
Mike Davies
- 488 14:50–15:05  
**Nutritional standards and diet considerations of owners and their pets: a two-country study**  
Meagan Burtynsky
- 488 15:05–15:20  
**Batch-to-batch variation in the iodine content of complete, wet foods for cats**  
Rebecca Alborough
- 489 15:20–15:35  
**Fat dog slim: impact of a social marketing video on the behaviour of pet owners regarding obesity in the dog**  
Eleni Androutsou

## Oral presentations

# The use of contrast-enhanced computed tomography for the diagnosis of hiatal hernia in brachycephalic dogs suffering from the Brachycephalic Obstructive Airway Syndrome (BOAS)

**Olivia Oginska, Jane Ladlow,  
Marie-Aude Genain, Micheal O'Cathasaigh,  
Jonny Hughes and Nai-Chieh Liu**

University of Cambridge, Cambridge, United Kingdom

## OBJECTIVES

To assess the prevalence of hiatal hernia (HH) in BOAS dogs and review the utility of the contrast-enhanced CT in the process of diagnosing HH in those patients.

## METHODS

A retrospective study was performed on the CT images obtained from 88 patients, 42 of them were contrast enhanced. All images were reviewed by 3 imagers and the presence of HH was assessed. The prevalence of HH was calculated within both the plain and the contrast-enhanced groups.

21 randomly chosen contrast-enhanced studies were initially viewed without the contrast in order to diagnose HH. Subsequently, they were re-assessed with contrast enhancement.

## RESULTS

In the plain group HH was diagnosed in 28% of the cases, whereas among the contrast-enhanced studies HH was found in 50% of them. The assessment of the 21 studies showed that in 50% of the cases the presence of contrast changed the final diagnosis. Additionally, all the imagers equivocally stated that introduction of the contrast significantly increased the level of the decision confidence in borderline cases.

## STATEMENT (CONCLUSIONS)

The study revealed a high prevalence of HH in BOAS-affected dogs. It also showed an increase in the detectability of HH, when the contrast CT is performed. Contrast-enhanced images allow more precise recognition of the tomographic features of HH and differentiation from other soft-tissue malformations such as esophageal diverticulum. To the author's knowledge, this the first study in the veterinary literature that describes the tomographic features of HH.

# Computed tomographic and surgical findings of retained surgical sponges in two dogs

**Kyriakos Chatzimisios, Michael Patsikas,  
Vasileia Angelou, Lysimachos Papazoglou**

Companion Animal Clinic, School of Veterinary Medicine,  
Aristotle University of Thessaloniki, Thessaloniki, Greece

## OBJECTIVES

The aim of this case report is to assess the relationship between the computed tomographic and the exploratory laparotomy findings in two dogs with retained surgical sponges.

## METHODS

Two dogs were referred with a history of depression and chronic vomiting following previous ovariohysterectomy. Clinical examination revealed a palpable abdominal mass in both dogs. In the first dog computed tomography (CT) scan of the abdomen revealed a 36 x 44 mm well demarcated intramural small intestinal mass with air attenuating center surrounding by a soft tissue attenuating ring. In the second dog CT demonstrated a 32 x 31 mm well demarcated soft tissue attenuating peritoneal mass with no intestinal loops displacement. Enhanced CT examination demonstrated peripheral ring enhancement of the mass in both cases finding compatible with the presence of abscess or granuloma.

## RESULTS

Surgical exploration was performed in both dogs. In the first dog, a retained surgical sponge was detected within the intestinal lumen and intestinal resection and anastomosis were followed. One day after surgery the dog had showed signs of intestinal dehiscence and

peritonitis but the owner declined further surgery and decided to have the dog euthanized. In the second dog an encapsulated surgical sponge was found adhered to the jejunum. Following release of the adhesions the mass was removed and the dog was discharged 2 days after surgery.

## STATEMENT (CONCLUSIONS)

CT is a valuable method for the diagnosis of retained surgical sponges. The retained sponges usually have a characteristic CT appearance resembling granulomas and this may be helpful in preoperative diagnosis and prognosis of them.

# Duplex and compressibility ultrasound examination in canine thoracic limb

**Joanna Lodzinska, Hannah Leigh, Magdalena Parys, Tiziana Liuti**

University of Edinburgh HFSA, Edinburgh, United Kingdom

## OBJECTIVES

To describe Duplex ultrasound (US) and compressibility technique for superficial vascular examination in dogs. To characterize ultrasonographic features of normal canine cephalic vein and compare them with veins of dogs with clinically diagnosed phlebitis and thrombophlebitis.

## METHODS

Prospective, descriptive study was performed in dogs presented for radiotherapy at the Hospital for Small Animals. Thirty dogs with no evidence of vascular disease

and 17 dogs with positive Visual Infusion Phlebitis (VIP) score were recruited for the study. All US examinations were performed and interpreted by one observer who was blinded to the clinical score. Cephalic veins were assessed for multiple criteria and Spearman's rank correlation coefficient was calculated between the findings and time the intravenous catheter (IVC) was in place.

## RESULTS

Successful and complete US examination was conducted in less than 5 minutes in all dogs. Scanning procedure was well tolerated in all patients. No abnormal US findings were detected in normal dogs group. All dogs with clinical phlebitis showed ultrasonographic changes (15/17 dogs increased wall thickness; 8/17 increased wall echogenicity; 7/17 disturbed Doppler flow; 10/17 incomplete compressibility; 10/17 presence of intraluminal thrombus). No strong correlation was found between the time the IVC was in place and US changes.

## STATEMENT (CONCLUSIONS)

Duplex and compressibility ultrasonographic studies are feasible and safe techniques for evaluation of cephalic veins in dogs. Dogs with phlebitis show ultrasonographic changes therefore ultrasound is a diagnostic tool in cases of clinically suspected phlebitis and thrombophlebitis.

# Retrospective evaluation of dietary management in glycaemic stabilisation and cataract formation in 152 dogs with diabetes mellitus

**Mike Davies<sup>1</sup>, Emma Smith<sup>2</sup>**

<sup>1</sup> Provect Limited, Rotherham, United Kingdom

<sup>2</sup> University of Nottingham, Nottingham, United Kingdom

## OBJECTIVES

Cataract formation secondary to hyperglycaemia is common in dogs with insulin-dependent diabetes mellitus (IDDM). Dietary management should facilitate stabilisation of hyperglycaemia with insulin and thereby delay or prevent cataract formation. Objectives: Evaluation of effect of dietary management on glycaemic stabilisation and cataract formation in dogs with IDDM.

## METHODS

Data for 152 diabetic dogs attending a UK Veterinary Hospital were obtained from clinical records and a questionnaire survey circulated. 100/152 (65.8%) developed cataracts after diagnosis of IDDM.

## RESULTS

From point of diagnosis there was no significant difference in the time to stabilisation of glycaemia, in the

# Oral presentations

likelihood of cataracts forming or in the time interval from diagnosis to cataract formation irrespective of diet type provided or whether dogs were given treats or not ( $p > 0.05$ ). Stabilisation was quicker in dogs with a high compared to dogs with a low body condition score ( $p = 0.0045$ ).

## STATEMENT (CONCLUSIONS)

The type of diet fed, wet or dry, with or without additional treats did not affect stabilisation or cataract formation. As high BCS made glycaemic stabilisation easier screening of middle-age obese dogs to detect IDDM early prior to weight loss due to disease is recommended.

## Nutritional standards and diet considerations of owners and their pets: a two-country study

Meagan Burtynsky<sup>1</sup>, Teresa Hollands<sup>2</sup>

1 University of Surrey, Guildford, United Kingdom

2 University of Surrey, Guildford, United Kingdom

### OBJECTIVES

With over half of the UK canine population overweight and the human population in the UK surpassing the obesity rates of Canada, a two-country study was conducted to understand the reasons for these differences. This study aims to identify the perception of obesity, the human animal bond, and the veterinary consult as areas influencing canine obesity and diet.

### METHODS

Both UK and Canadian dog owners were surveyed using a cross-sectional questionnaire study online and a

veterinary practice. Data was analyzed using descriptive statistics, chi square test, and regression, with  $p < 0.05$  (calculated probability) indicating significance.

### RESULTS

The consult length was significantly longer in Canada (31% were 20–30 mins) compared to the UK (35% was <10 mins) ( $p = 5.98 \times 10^{-6}$ ). Canadian owners were more likely to have a specific nutritional consult with their veterinarian ( $p = 0.0003$ ) facilitated partly by nurses taking histories to allow more opportunity for nutritional and obesity discussions with the veterinarian. More alternative treatments, such as nutritional management ( $p = 0.013$ ) and supplemental management ( $p = 0.0063$ ), were used to treat conditions in the Canadian canine population when compared to the UK. Canadian owners listed their veterinarian as the primary source of nutritional information, whereas UK owners listed the internet.

## STATEMENT (CONCLUSIONS)

The awareness and use of veterinary nutrition in prevention and treatment of small animals is greater in Canada compared to the UK. Modifying veterinary consults in the UK, incorporating nutrition as the 5th vital sign and placing an economical value on the nutritional consult could have a positive influence on canine obesity. Barriers to this need studying.

## Batch-to-batch variation in the iodine content of complete, wet foods for cats

Rebecca Alborough, David Gardner

University of Nottingham School of Veterinary Medicine and Science, Sutton Bonington, United Kingdom

### OBJECTIVES

Hyperthyroidism is the most common endocrinopathy diagnosed in domestic cats<sup>[1]</sup>. Many risk factors have been proposed and development of the disease is likely

multifactorial<sup>[2]</sup>. Clinically and histopathologically, feline hyperthyroidism resembles toxic nodular goitre (TNG), a form of human hyperthyroidism caused by excessive dietary iodine intake after a period of iodine deficiency<sup>[3,4]</sup>. Thus, fluctuation in dietary iodine intake may also promote development of feline hyperthyroidism. Here, we determined iodine content of cat foods, across multiple batches to test for consistency.

### METHODS

Two to five different batches of nine complete-labelled, wet foods for cats were freeze-dried, powdered, sampled in duplicate and microwave-digested using tetramethylammonium hydroxide (TMAH) for analysis of iodine content by inductively-coupled plasma-mass spectrometry (ICP-MS). A certified reference material (Serionorm L2, LGC Standards: iodine = 295 µg/L) was used as a QC.

## RESULTS

Food 3 had the greatest between-batch variation in iodine content, closely followed by Foods 5 and 7 (min-max [range]: 0.720–1.392 [0.673], 0.644–1.217 [0.573] and 0.312–0.731 [0.419] mg/100g DM, respectively). All other foods analysed showed only minimal batch-to-batch variation in iodine content. Further, some batches of Foods 1, 3, 5 and 9 had iodine content outside of the

nutritional range for complete, adult cat foods recommended by FEDIAF<sup>[5]</sup>.

## STATEMENT (CONCLUSIONS)

Diets analysed here with high dietary iodine tended to have highest batch-to-batch variation and could underpin a susceptibility to feline hyperthyroidism.

# Fat dog slim: impact of a social marketing video on the behaviour of pet owners regarding obesity in the dog

**Eleni Androutsou, Samuel Rosenbaum, Mya Murray, Philippa Yam**

University of Glasgow, Glasgow, United Kingdom

## OBJECTIVES

Obesity causes a serious threat to the health, quality of life and longevity of pets. Prevention of obesity has been identified as a priority area for canine welfare but current strategies have failed to halt its inexorable rise. Social marketing has been an effective tool for treating human obesity and potentially could be used in veterinary

medicine to more effectively tackle this problem. The project aims were firstly, to create a social marketing video and secondly, to determine its effectiveness.

## METHODS

A video was produced about canine obesity containing clear information to reduce and prevent canine obesity. A questionnaire was conducted pre and post viewing of the video to determine its effectiveness in imparting knowledge about, and strategies to treat and prevent, obesity. Statistical analysis was performed using SPSS software programme.

## RESULTS

A video of 2 min 20s was produced with 5 clear take home points about obesity (<https://youtu.be/Ta2k9voS2po>). 204 participants completed the questionnaire. Pre and post viewing of video, knowledge about obesity prevention strategies increased significantly ( $p < 0.001$ ).

## STATEMENT (CONCLUSIONS)

Social marketing for the prevention of canine obesity is a viable option and should be considered as a means for widespread education of the public.



Friday 5 April  
Telford Room

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# Soft tissue surgery

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- 492 08:30–08:45  
**Study of intra-abdominal pressure elevation after mastectomy in dogs**  
Styliani Kleftouri
- 492 08:45–09:00  
**Gastrostomy feeding tube placement in dogs with septic peritonitis: a retrospective study of 54 dogs**  
Kine Elmenhorst
- 493 09:00–09:15  
**The *in vitro* antimicrobial activity of triclosan coated polydioxanone suture material on bacteria commonly isolated from canine wounds**  
Joanna McCagherty
- 493 09:15–09:30  
**A comparison of the rates of postoperative complications between dogs undergoing laparoscopic and open ovariectomy**  
Tim Charlesworth
- 494 09:30–09:45  
**Incidence and risk factors for post-attenuation neurological signs in 50 cats with a single congenital portosystemic shunt**  
Rhiannon Strickland
- 494 09:45–10:00  
**Thoracic dog bite wounds: a retrospective study of 123 dogs (2003–2016)**  
Anna Frykfors von Hekkel
- 495 10:00–10:15  
**Prevalence of pulmonary changes detected using computerised tomography in brachycephalic breeds compared to mesaticephalic breeds**  
Aaron Lutchman

## Oral presentations

### Study of intra-abdominal pressure elevation after mastectomy in dogs

**Styliani Kleftouri<sup>1</sup>, Maria Vafeiadou<sup>2</sup>, George Kazakos<sup>3</sup>, Erika Kirmanidou<sup>3</sup>, Lysimachos Papazoglou<sup>3</sup>**

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<sup>2</sup> Private Practice, Limassol, Cyprus

<sup>3</sup> Aristotle University of Thessaloniki, Thessaloniki, Greece

#### OBJECTIVES

To assess the intra-abdominal pressure (IAP) after regional mastectomy as well as to evaluate the predisposing factors and the clinical significance of its potential increase.

#### METHODS

Nineteen female dogs that underwent regional mastectomy were enrolled in a prospective study. IAP was measured five times; preoperatively, at the end of surgical

procedure and 1, 6 and 18 hours postoperatively. Simultaneously, the arterial pressure as well as the urine output were monitored, abdominal perfusion pressure (APP) was calculated and a pain score was determined.

#### RESULTS

Preoperatively, mean IAP was 4.56 mm Hg, with 1.40 mm Hg standard deviation (SD). These figures were elevated in the postoperative measurements, with the maximum being detected 1 hour after surgery at 8.58 mm Hg mean IAP (SD: 2.9 mm Hg), remaining at similar levels for the rest study period. The mean arterial pressure was slightly increased postoperatively, while the urine output did not fall below 1 ml/kg/h. Furthermore, APP was kept above 70 mmHg throughout the whole study. Although pain was at low levels, in 4 cases with a greater score than the average, IAP appeared higher in all postoperative measurements. Moreover, IAP showed a tendency to increase the more extended the mastectomy was.

#### STATEMENT (CONCLUSIONS)

An elevation of the intra-abdominal pressure can be observed postoperatively in dogs undergoing regional mastectomy, presumed due to the tension caused in the abdominal wall after the closure of the skin. This indicates that these pressure alterations should be identified and controlled for possible clinical impacts.

### Gastrostomy feeding tube placement in dogs with septic peritonitis: a retrospective study of 54 dogs

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<sup>2</sup> Dick White Referrals, Six Mile Bottom, United Kingdom

<sup>3</sup> Langford Vets Small Animal Referral Hospital, Bristol, United Kingdom

#### OBJECTIVES

To describe the utility and determine the safety of surgically placed gastrostomy feeding tubes in dogs with septic peritonitis.

#### METHODS

A retrospective analysis of fifty-four dogs from one institution with septic peritonitis that had undergone surgical

exploration that either had or did not have a gastrostomy tube (De Pezzer or Foley) placement as part of the surgical procedure. Postoperative recovery time, hospitalisation time, complication rate and overall survival time were documented.

#### RESULTS

Eleven dogs had no gastrostomy tube placed, fifteen dogs had a Foley gastrostomy tube placed and twenty-three dogs had a de Pezzer gastrostomy tube placed. The most common cause of septic peritonitis was dehiscence of an enterotomy or enterectomy site. The median time from surgery to first intake of enteral nutrition was 18 hours (range 3–60 hours). No major complications related to the gastrostomy tube were seen, and minor complications were seen in 32% and 13% of the de Pezzer and the Foley gastrostomy group respectively. The overall median time spent in hospital were 5 days (range 3–29 days) in patients surviving to discharge, and an overall survival rate of 52% were recorded. There were no differences between the three groups in terms of time spent in hospital or survival rate.

#### STATEMENT (CONCLUSIONS)

This study suggests that gastrostomy feeding tubes are a straightforward method of providing enteral nutrition to dogs with septic peritonitis, have similar complication rates to placement in non-septic patients and do not appear to cause any detrimental effect on survival rate.



# The *in vitro* antimicrobial activity of triclosan coated polydioxanone suture material on bacteria commonly isolated from canine wounds

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Gavin Paterson<sup>3</sup>, Tim Nuttall<sup>1</sup>

- 1 Hospital for Small Animals, University of Edinburgh, Edinburgh, United Kingdom
- 2 University of Glasgow, Glasgow, United Kingdom
- 3 University of Edinburgh, Edinburgh, United Kingdom

## OBJECTIVES

1. To determine the *in vitro* effects of triclosan coated (PDS Plus®) and non-coated (PDS II®) suture material on bacterial growth
2. To determine the *in vitro* duration of bacterial inhibition of PDS Plus® suture

## METHODS

10 clinical isolates of *Pseudomonas aeruginosa*, *Staphylococcus pseudintermedius*, methicillin-resistant *S. pseudintermedius* (MRSP), *Escherichia coli*, and extended spectrum beta-lactamase (ESBL)-producing *E. coli* plus appropriate National Collection of Type Cultures controls. Isolates were incubated with PDS Plus®, PDS II®, an antibiotic disc of known efficacy, and a negative control following EUCAST guidelines. The zone of inhibition (ZI) around the suture material and antimicrobial discs was recorded. Sustained efficacy assays were performed as above (excluding *P. aeruginosa*), moving the suture material to a fresh culture every 24 hours.

## RESULTS

ZIs were seen around PDS Plus® but not PDS II®. Confluent growth occurred with all the *P. aeruginosa* isolates. ZIs were seen with PDS Plus® for 20 days with *S. pseudintermedius* and MRSP, 15 days for *E. coli*, and 11 days for ESBL-*E. coli*.

## STATEMENT (CONCLUSIONS)

PDS Plus® exhibits sustained *in vitro* antimicrobial activity against *S. pseudintermedius*, MRSP, *E. coli* and ESBL-*E. coli*. PDS Plus® could therefore reduce the prevalence of these wound infections in veterinary patients, although further studies are required to confirm this *in vivo*.

# A comparison of the rates of postoperative complications between dogs undergoing laparoscopic and open ovarioectomy

Tim Charlesworth, Francisco Torres Sanchez

Eastcott Referrals, Swindon, United Kingdom

## OBJECTIVES

To test the hypothesis that dogs undergoing laparoscopic ovarioectomy have a lower overall and wound-healing complication rate than dogs undergoing an open surgical approach.

## METHODS

A retrospective study of dogs who underwent ovarioectomy between January 1st 2013 and January 1st 2018. Cases were all operated on by the same team of similarly experienced surgeons using standard, practice anaesthetic, theatre and perioperative protocols. General complications were recorded, and graded using the Clavien-Dindo system. Complication rates were compared between the two groups of dogs. Wound complications were further subdivided using CDC guidelines into inflammation only, superficial SSI and deep SSI categories. Rates of wound dehiscence were also recorded.

## RESULTS

Using strict definitions and adhering to the Clavien-Dindo system, 44.3% of 106 dogs undergoing open ovarioectomy developed a recorded complication. 30 dogs (28.3%) had wound healing complications the majority of which were minor and self limiting. Superficial SSI was seen in 4.7% cases and deep SSI in 0.9%. Incisional herniation occurred in 3.7% cases.

## Oral presentations

20.1% of 154 dogs undergoing laparoscopic ovariectomy developed a recorded complication. 11% developed wound healing complications most of which were minor and self limiting. The rate of superficial SSI was 3.2% with no cases of deep SSI recorded. No incisional herniation occurred in any laparoscopic cases.

### STATEMENT (CONCLUSIONS)

Laparoscopic ovariectomy is associated with a decreased risk of postoperative complication and SSI compared to open ovariectomy. Laparoscopy should be considered the approach of choice when performing ovariectomy in dogs.

## Incidence and risk factors for post-attenuation neurological signs in 50 cats with a single Congenital Portosystemic Shunt

**Rhiannon Strickland<sup>1</sup>, Mickey Tivers<sup>2</sup>, Vicky Lipscomb<sup>1</sup>**

- 1 Department of Clinical Science and Services, Royal Veterinary College, London, United Kingdom
- 2 Paragon Veterinary Referrals, Wakefield, United Kingdom

### OBJECTIVES

To determine the incidence, outcome, and risk factors for post attenuation neurological signs (PANS) and seizures after attenuation of single congenital portosystemic shunts (CPSS) in cats.

### METHODS

Medical records of cats treated at a single institution by surgical attenuation of a single CPSS between 2003

and 2017 were reviewed for signalment and preoperative and postoperative clinical outcomes, including the occurrence of PANS and seizure activity. Binary logistic regression was performed to investigate risk factors.

### RESULTS

Fifty cats undergoing surgical CPSS attenuation were included (80% extrahepatic, 20% intrahepatic). Eleven (22%) of cats had complete attenuation, 39 (68%) had a partial attenuation. Thirty one (62%) cats suffered PANS, including 11 (22%) cats that experienced seizures. Of the 31 cats that suffered PANS, 5 (16.1%) did not survive to discharge.

There were no significant associations between PANS or seizures and the type of CPSS, degree of attenuation, age, the use of pre-operative anti-seizure medication or the presence of HE immediately before surgery. Osmolality at time point 3 (median 24 hours) was lower in cats with PANS and this was a significant risk factor ( $p = 0.049$ , odds ratio 0.855).

### STATEMENT (CONCLUSIONS)

PANS is a significant complication and cause of mortality in cats treated surgically for CPSS. Peri-operative levetiracetam did not seem to protect against the development of PANS. Postoperative changes in osmolality were associated with the development of PANS. Further studies are required to determine the importance of this finding.

## Thoracic dog bite wounds: a retrospective study of 123 dogs (2003–2016)

**Anna Frykfors von Hekkel, Zoë Halfacree**

Royal Veterinary College, London, United Kingdom

### OBJECTIVES

To compare clinical findings, investigate indications for thoracotomy and identify factors associated with outcome in dogs with thoracic dog bite wounds.

### METHODS

Medical records of dogs with thoracic dog bite wounds presenting to a single institution were retrospectively reviewed. Data relating to clinical presentation, wound depth and management, radiographic findings and mortality were collected. Wound management was defined

as conservative, exploratory or requiring thoracotomy. Statistical analyses were performed using Chi-squared and Fisher's Exact Test.

## RESULTS

123 dogs met inclusion criteria, (54% first opinion, 46% referral), median age was 48 months and median body-weight was 12.75 kg. Thirty dogs (24%) suffered penetrating wounds, 35 (29%) deep wounds, 44 (36%) full thickness skin wounds and 14 (11%) partial thickness skin wounds. Sixty-nine dogs (56%) suffered wounds elsewhere, most commonly to the cervical region ( $n = 22$ ), abdomen ( $n = 21$ ) and limbs ( $n = 21$ ). Bacterial culture was positive in 50% of cases, frequently polymicrobial, and most commonly revealed *Staphylococcus*, *E.coli*, *Pasteurella* or *Enterococcus* species. The most common

radiographic lesions were pneumothorax ( $n = 31$ ), rib fracture/avulsion ( $n = 29$ ), pulmonary contusions ( $n = 23$ ) and pleural effusion ( $n = 13$ ). These radiographic lesions were all significantly associated with each other, presence of a penetrating wound and decision to perform thoracic exploration. Undergoing thoracic exploration was not significantly associated with mortality, however undergoing exploratory coeliotomy was. The most common cause of death was suspected sepsis/SIRS. The overall mortality rate was 18%.

## STATEMENT (CONCLUSIONS)

Clinical application of the presented data may facilitate both specialist and general practitioners' decision regarding management of canine thoracic bite wounds.

# Prevalence of pulmonary changes detected using computerised tomography in brachycephalic breeds compared to mesaticephalic breeds

**Aaron Lutchman, Lynda Rutherford**

Department of Clinical Science and Services, The Royal Veterinary College, Hawkshead Lane, North Mymms, Hatfield, Hertfordshire, AL9 7TA, Hatfield, United Kingdom

## OBJECTIVES

The aims of this observational, analytical, retrospective study were to (i) obtain computed tomographic (CT) data on pulmonary alterations visible in extreme brachycephalic breeds, and (ii) compare the pulmonary alterations between brachycephalic and mesaticephalic breeds. It has been demonstrated that extreme brachycephalic dog breeds (English Bulldogs, French Bulldogs and Pugs) are at increased risk of developing aspiration pneumonia

but it is not known if they are more susceptible to pulmonary parenchymal changes detected on CT scan compared to weight matched mesaticephalic dogs. This study is important to help to further evaluate and understand components of brachycephalic airway syndrome (BAS), including lower airway changes.

## METHODS

246 CT scans were analysed, with 213 brachycephalic dogs and 33 mesaticephalic dogs. CTs from dogs in the mesaticephalic control group were excluded if they had any current or historical clinical signs relating to respiratory disease.

## RESULTS

87/213 (40%) of the brachycephalic group had pulmonary changes documented compared with 7/33 (21%) of the mesaticephalic group. 36/213 (16%) of the brachycephalic dogs had pulmonary changes consistent with pneumonia compared with 0/33 of the mesaticephalic dogs. 20/213 (9%) of the brachycephalic dogs had pulmonary consolidation compared to 1/33 (3%) of the mesaticephalic dogs. 63/213 (29%) of the brachycephalic dogs had atelectasis compared with 6/33 (18%) of the mesaticephalic dogs.

## STATEMENT (CONCLUSIONS)

Individual variation was found among the brachycephalic breeds and further studies investigating the relationship between pulmonary changes, clinical disease and severity of brachycephalic airway syndrome are warranted.



Friday 5 April  
Telford Room

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# Neurology

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- 498 14:30–14:45  
**Masticatory Muscle Myositis in Dogs: the use of Dexamethasone as an alternative corticosteroid treatment - outcomes and side effects (Preliminary Results)**  
Max Foreman
- 498 14:45–15:00  
**Troponin I elevation in dogs with acute cerebrovascular disease**  
Rita Goncalves
- 499 15:00–15:15  
**Clinical reasoning in canine cervical hyperaesthesia: which presenting factors are important?**  
Nick Grapes
- 499 15:15–15:30  
**Thoracic vertebral canal stenosis in screw-tailed brachycephalic dog breeds**  
Alessandro Conte
- 500 15:30–15:45  
**Assessment of quality of life in untreated mild idiopathic canine epilepsy**  
Lara Baptista

## Oral presentations

# Masticatory Muscle Myositis in Dogs: the use of Dexamethasone as an alternative corticosteroid treatment - outcomes and side effects (Preliminary Results)

**Max Foreman, Giunio Bruto Cherubini**

Dick White Referrals, Six Mile Bottom, United Kingdom

## OBJECTIVES

This study aims to assess the efficacy of dexamethasone as the corticosteroid treatment for masticatory muscle myositis (MMM) in dogs. We hypothesise that dexamethasone is an effective treatment, either alone or in conjunction with other immunosuppressant medications, for MMM in dogs and that side effects of treatment are minimal.

## METHODS

This retrospective single-centre case series describes the outcome following treatment of dogs diagnosed with MMM with Dexamethasone +/- additional immunosuppressive agents (Azathioprine/Ciclosporine). The study population consists of 18 dogs presented to our referral hospital between March 2011 and September 2018 that were subsequently diagnosed with MMM.

## RESULTS

Of the 18 dogs diagnosed over the study period with MMM, follow up records were available at the time of abstract submission for 14 dogs. On examination between two and four weeks after instigation of treatment, eight dogs (57%) showed a full resolution of signs, five (38%) showed a partial response and one (7%) showed no response.

Records were available for follow up examination between six and ten weeks for 10 dogs. Of these dogs, seven (70%) showed a full resolution of signs and three (30%) showed a partial resolution.

In all cases an acceptable quality of life was achieved, with all dogs having good response to treatment. Six (40%) experienced side effects attributed to steroid treatment, only one (7%) necessitated modification of the treatment regime.

## STATEMENT (CONCLUSIONS)

These preliminary results demonstrate that dexamethasone can be used effectively to treat MMM in dogs, as an alternative corticosteroid to prednisolone. A mild degree of morbidity is associated with dexamethasone use.

# Troponin I elevation in dogs with acute cerebrovascular disease

**Rita Goncalves, Daniel Sanchez-Masian, Joanna Dukes-McEwan**

University of Liverpool, Neston, United Kingdom

## OBJECTIVES

Cardiac troponin I (cTnI) is a highly selective and specific marker of myocardial necrosis. It is elevated in some human patients with acute cerebrovascular accidents (CVA) and carries a worse prognosis in terms of fatality and disability. Our main aims were to determine if dogs with CVAs have elevated cTnI concentrations and if so, if this associated with a worse prognosis and with possible underlying cardiac disease.

## METHODS

Dogs presented for investigation of acute neurological deficits (less than 1 week duration) and diagnosed with

CVA by magnetic resonance imaging were prospectively enrolled and cTnI levels, systolic blood pressure, electrocardiogram and echocardiogram were performed in these patients. Short and long-term follow-up were subsequently obtained to determine if there is an association between the cTnI levels and survival.

## RESULTS

Eighteen dogs met the inclusion criteria. Clinical signs varied depending on the location of the infarct but were in most cases compatible with central vestibular disease with 10/18 dogs being non-ambulatory on presentation. cTnI levels were increased in all dogs but 1 (median 0.95 ng/ml, range 0.146–153). Echocardiography revealed preclinical myxomatous valve disease in 12/18, dilated cardiomyopathy in 1/18 and aortic stenosis in 1/18 dogs but this was not considered to be the underlying cause for the CVA in any dog. Concurrent medical conditions identified included primary hypertension (5), renal disease and hypertension (4) and hyperadrenocorticism (2).

## STATEMENT (CONCLUSIONS)

cTnI levels were commonly increased in dogs with CVA but were not thought to be associated with underlying cardiovascular disease.

# Clinical reasoning in canine cervical hyperaesthesia: which presenting factors are important?

**Nick Grapes, Steven De Decker, Rowena Packer**

Royal Veterinary College, London, United Kingdom

## OBJECTIVES

To identify parameters from the history, presentation, physical and neurological examination of dogs presenting with cervical hyperaesthesia that were statistically associated with the underlying disease diagnosis.

## METHODS

A retrospective study was performed containing 385 dogs presenting with cervical hyperaesthesia as the primary reason for clinical presentation between January 2010 and October 2018. Only cases presenting for cervical hyperaesthesia were included, while those presenting for others reasons with neck pain as a secondary problem were excluded.

Univariate analysis of variables (breed, age, weight, onset, progression, asymmetry, neuroanatomical localisation, haematology changes and pyrexia) were performed and variables with  $P < 0.30$  were retained in a multinomial logistic regression model. Non-normally distributed continuous variables were analysed with a Kruskal-Wallis test.

## RESULTS

95.3% of cervical hyperaesthesia presentations were represented by only 8 conditions which included intervertebral disc extrusion (IVDE) ( $n = 121$ ), steroid-responsive meningitis arteritis (SRMA) ( $n = 100$ ), syringomyelia (SM) ( $n = 63$ ), intervertebral disc protrusion (IVDP) ( $n = 49$ ), neoplasia ( $n = 11$ ), cervical spondylomyelopathy (CSM) ( $n = 10$ ), meningitis of unknown aetiology (MUA) ( $n = 8$ ) and immune-mediated polyarthritis (IMPA) ( $n = 5$ ). Younger age, pyrexia and haematology changes were associated with a diagnosis of SRMA (all  $p < 0.001$ ). Neoplasia was common in older dogs ( $p < 0.001$ ). Breed associations were evident with 81.4% ( $n = 35$ ) of French Bulldogs diagnosed with IVDE and 84.1% ( $n = 53$ ) of Cavalier King Charles Spaniels diagnosed with syringomyelia.

## STATEMENT (CONCLUSIONS)

Easy-to-recognise clinical features can be used to identify the most likely differential diagnosis for dogs presenting with cervical hyperaesthesia. This information can be implemented by veterinary surgeons evaluating dogs with this clinical presentation.

# Thoracic vertebral canal stenosis in screw-tailed brachycephalic dog breeds

**Alessandro Conte<sup>1</sup>, Marco Bernardini<sup>2</sup>, Steven De Decker<sup>3</sup>, Cristoforo Ricco<sup>4</sup>, Sebastien Behr<sup>4</sup>, Daniel Sanchez-Masian<sup>5</sup>, Giunio Bruto Cherubini<sup>6</sup>, Luisa De Risio<sup>7</sup>, Rodrigo Gutierrez-Quintana<sup>8</sup>**

1 Animal Health Trust, Newmarket, United Kingdom

2 Ospedale Veterinario 'I Portoni Rossi', Zola Pedrosa, Italy

3 Royal Veterinary College - RVC, London, United Kingdom

4 Willows Veterinary Centre & Referral Service, Solihull, United Kingdom

5 University of Liverpool, Liverpool, United Kingdom

6 Dick White Referrals, Six Mile Bottom, United Kingdom

7 Animal Health Trust, Newmarket, United Kingdom

8 Small Animal Hospital - University of Glasgow, Glasgow, United Kingdom

## OBJECTIVES

To 1) describe clinical and imaging features of thoracic vertebral canal stenosis secondary to hypertrophy of the vertebral lamina and articular processes in screw-tailed brachycephalic dogs, to 2) evaluate its prevalence and to 3) determine if the degree of stenosis is associated with neurological signs.

## METHODS

Retrospective multicentre study. Clinical records of screw-tailed brachycephalic dogs (French bulldogs, English bulldogs, Boston terriers and pugs) presented to seven institutions were reviewed. Twelve dogs with neurological deficits secondary to thoracic vertebral canal stenosis diagnosed on MRI were identified (Group 1). Signalment, clinical signs, imaging findings and treatment were recorded. One hundred and twenty-five neurologically normal dogs of the same breeds underwent CT imaging of the thoracic vertebral column for other medical reasons (Group 2). Cross-sectional measurements at the vertebral canal stenosis and immediately cranially were used to calculate a stenotic ratio. Both groups were compared using Mann-Whitney U test ( $p < 0.05$ ).

## RESULTS

Group 1 consisted of three French bulldogs, eight English bulldogs and one pug. Nine were males. All dogs were

# Oral presentations

paraparetic on presentation; one was non-ambulatory. Twenty-three stenotic regions were identified with the most common region being T4–T5. Three dogs were treated surgically and all had a good long-term outcome. In Group 2, 33/175 dogs had at least one stenotic region with the most common being T2–T3. The degree of the stenosis was significantly higher in Group 1 ( $p = .01928$ ).

## STATEMENT (CONCLUSIONS)

Thoracic vertebral canal stenosis can affect screw-tailed brachycephalic breeds. The vertebral canal in neurologically-affected screw-tailed brachycephalic dogs was 21.2% smaller compared to non-neurologically affected dogs.

## Assessment of quality of life in untreated mild idiopathic canine epilepsy

Lara Baptista<sup>1</sup>, Laura Barlow<sup>1</sup>, Lisa Alves<sup>2</sup>

<sup>1</sup> University of Cambridge, Cambridge, United Kingdom

<sup>2</sup> University of Cambridge, Cambridge, United Kingdom

## OBJECTIVES

To assess and compare the quality of life of a population of untreated dogs with mild idiopathic epilepsy *versus* a control group medicated with anti-epileptic drugs.

## METHODS

Cross-sectional study. Two online questionnaires were developed for dogs receiving treatment and dogs untreated, and included quality of life associated questions. Carers were contacted by email and data acquired

from 2009 to 2017. The results were analysed using Microsoft Excel® and Graphpad Software.

## RESULTS

A total of 41 surveys were sent, with 26 replies for the control group and 7 for the untreated group and included 5 themes: "Abnormal behaviours", "Carers' quality of life", "Dog's quality of life" and "Acceptability and progression of seizure frequency and severity". The untreated dogs did not show progression of seizure frequency or severity. There were statistically significant differences between the two groups in the quality of life of both the dogs and the carers. Epilepsy did not seem to impact the lives of carers in the non-medicated group. Equally, untreated dogs were perceived to have higher quality of life rates when compared to the medicated group.

## STATEMENT (CONCLUSIONS)

Untreated patients with mild idiopathic epilepsy displayed higher quality of life ratings, as well as their carers, when compared to the medicated group. Moreover, there was no progression of disease in either frequency or severity, which contrasts with the accepted definition of epilepsy as a progressive condition, suggesting that in some patients there may be no disease progression.



Friday 5 April  
Telford Room

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# Neurology and anaesthesia & critical care

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- 502 16:50–17:05  
**Vestibular disease in dogs under UK primary veterinary care: epidemiology and clinical management**  
Sinziana Maria Radulescu
- 502 17:05–17:20  
**Incidence and clinical significance of Cystic Pharyngeal Hypophysis (Rathke's Pouch) in the dog**  
Mike Targett
- 503 17:20–17:35  
**Preliminary findings of an investigation into the association between vaccination and immune-mediated diseases of the canine central nervous system**  
Man Ching Chan
- 503 17:35–17:50  
**Is CT an alternative to MRI in a morphometric analysis system for prediction of Chiari-like malformation associated pain and syringomyelia?**  
Clare Rusbridge
- 504 17:50–18:05  
**The Erector Spinae Plane block for intraoperative analgesia in dogs undergoing hemilaminectomy: a retrospective study**  
Amanda Herron

## Oral presentations

# Vestibular disease in dogs under UK primary veterinary care: epidemiology and clinical management

**Sinziana Maria Radulescu<sup>1</sup>, Karen Humm<sup>1</sup>,  
Louis Mark Eramanis<sup>2</sup>, Holger Volk<sup>1</sup>,  
Dave C. Brodbelt<sup>1</sup>, David B. Church<sup>1</sup>,  
Dan G. O'Neill<sup>1</sup>**

<sup>1</sup> Royal Veterinary College, Hertfordshire, United Kingdom  
<sup>2</sup> University of Melbourne, Werribee Animal Hospital, Werribee, Australia

## OBJECTIVES

Vestibular disease, central and/or peripheral, can be a dramatic primary-care presentation. Current literature describes mostly referral caseloads. This study aimed to investigate the prevalence, presentation, management, and outcomes of vestibular disease in dogs in primary-care UK practices.

## METHODS

The study explored the VetCompass™ primary-care database. Potential vestibular disease cases during 2016

were identified before manual verification and further information was extracted.

## RESULTS

From 905,544 study dogs, 759 vestibular cases were confirmed giving an overall prevalence of 0.08% (95% CI 0.07–0.09%). Springer Spaniels had 3.74 (95% CI 2.97–5.06,  $P < 0.001$ ), Golden Retrievers 3.30 (95% CI 2.19–4.97,  $P < 0.001$ ), Border Collies 2.78 (95% CI 2.03–3.80,  $P < 0.001$ ) and Cavalier King Charles Spaniels 2.70 (95% CI 1.90–3.84,  $P < 0.001$ ) times the odds for vestibular disease compared with crossbreeds.

Mean age at first diagnosis was 12 (SD: 3) years. The most common presenting signs were head tilt (69.8%), nystagmus (68.1%) and ataxia (64.5%). Central involvement was recorded in 14.1% cases.

The most frequently used treatments were antiemetics (43.2%), corticosteroids (33.1%), antimicrobials (25%) and propentofylline (23.25%). Only 27/759 (3.6%) cases were referred. Improvement was recorded in 317/759 (41.8%) of the cases after a mean of 10 days from diagnosis. Of 232/759 (30.6%) deaths during the study period, vestibular disease contributed to death in 144/232 (62%).

## STATEMENT (CONCLUSIONS)

This study confirms low referral rates for vestibular disease cases, suggesting that primary-care data sources offer more generalisable information for benchmarking to help clinicians review their own clinical activities. Veterinarians should be aware of the strong breed predispositions identified here.

# Incidence and clinical significance of Cystic Pharyngeal Hypophysis (Rathke's Pouch) in the dog

**Mike Targett, Amy Gillespie,  
Kerstin Baiker**

University of Nottingham, Nottingham, United Kingdom

## OBJECTIVES

The pharyngeal hypophysis is the embryonic precursor to the anterior pituitary gland. Cystic expansion of this structure in the nasopharynx (previously termed Rathke's Pouch) has been reported on MRI images in a small case series of dogs and was associated with suspected

clinical significance. The aim of this study was to investigate the incidence and clinical significance in a large cohort of dogs.

## METHODS

A retrospective review of a database of canine head MRI was performed with subsequent post-mortem examination of a cohort of preserved canine cadaver specimens.

## RESULTS

Imaging changes consistent with a cystic pharyngeal hypophysis were identified on MRI images of 56 of 474 dogs (11.8%). Cysts were hyperintense to the surrounding mucosa on both T1 and T2 weighted images and could be identified in both sagittal and transverse planes. All cysts occurred in the roof of the nasopharynx on the midline. There was no evidence to suggest that the presence of these cysts was consistently associated with any clinical significance.

Gross examination of 25 preserved canine cadaver specimens demonstrated a grossly visible cystic mass lesion on the midline in the roof of the nasopharynx in

2 animals. Histopathological examination demonstrated a mucosal fluid containing cyst lined by ciliated, pseudostratified epithelium consistent with previous reports of pharyngeal hypophysis.

## STATEMENT (CONCLUSIONS)

Cystic pharyngeal hypophysis is a common finding on canine MRI which contrary to previous reports has no apparent consistent clinical significance

# Preliminary findings of an investigation into the association between vaccination and immune-mediated diseases of the canine central nervous system

**Man Ching Chan, Lisa Alves, Paul Freeman**

University of Cambridge, Cambridge, United Kingdom

## OBJECTIVES

To determine whether there is a temporal relationship between vaccination of any type and the onset of immune-mediated central nervous system diseases (MUO and SRMA) in dogs.

## METHODS

Retrospective, case-control study was conducted using data from the clinical records collected at a referral

hospital between 2011 and 2018 where vaccination records were available. 27 dogs with a diagnosis of inflammatory central nervous system disease were age- and gender-matched with an equal number of control dogs presented in the same time period for other diseases. Dogs who were vaccinated within 28 days before the onset of clinical signs of immune-mediated central nervous system disease were considered as a positive case in this study. To assess the association between recent vaccination and the onset of disease, odds ratio were calculated and categorical data was analysed using Fisher's exact test.

## RESULTS

Three of the 27 dogs in the immune-mediated central nervous system disease group had been vaccinated within 28 days before onset of clinical signs versus nine dogs in the control group. The odds ratio for a dog showing signs of MUO or SRMA if vaccinated within the last 28 days was 0.25 (95% confidence interval 0.06 to 1.06;  $p = 0.10$ ).

## STATEMENT (CONCLUSIONS)

In this population of dogs, recent vaccination did not increase the likelihood of development of immune-mediated CNS diseases, although a larger sample size is required to confirm this finding.

# Is CT an alternative to MRI in a morphometric analysis system for prediction of Chiari-like malformation associated pain and syringomyelia?

**Clare Rusbridge<sup>1,2</sup>, Angus McFadyen<sup>3</sup>, Felicity Stringer<sup>1</sup>, Susan Knowler<sup>2</sup>**

- 1 Fitzpatrick Referrals, Godalming, United Kingdom
- 2 University of Surrey, Guildford, United Kingdom
- 3 AKM-Stats, Glasgow, United Kingdom

## OBJECTIVES

A system of MRI morphometric analysis to predict Chiari-like malformation associated pain (CM-P) and syringomyelia (SM) has been developed. The analysis relies on bony landmarks and computer tomography (CT) of the skull and cervical vertebrae may be useful to predict disease risk i.e. as a more economical pre-breeding screening test.

## METHODS

This proof of principle pilot study compared morphometric analysis between MRI and CT. Medical records over 4 years were searched for dog breeds predisposed to CM-P and SM that had both MRI and CT head imaging. 13 dogs were identified (5 Chihuahua, 7 Cavalier King

# Oral presentations

Charles Spaniels, 1 Griffon Bruxellois). 13 measurements (1 circle, 1 ellipse, 7 lines, 4 angles) were taken on midsagittal T2 weighted MRI and CT images of the skull and cervical spinal cord.

## RESULTS

ICC Model (2,1) absolute agreement showed very good agreement for 9 measurements (ICC range 0.790–0.987); 3 measurements had some agreement (ICC range 0.585–0.687) and 1 angle had poor agreement (0.288). Measurements that used bony landmarks had better agreement.

## STATEMENT (CONCLUSIONS)

Morphometric analysis to predict risk of CM-P and SM can be applied to CT but refinement will be necessary. This may eventually be useful as a pre-breeding screening test especially if anatomical analysis software is developed. CT is not sensitive for SM and for the foreseeable future any hypothetical CT pre-breeding test for skeletally mature dogs would be combined with MRI from 5 years of age to determine the final CM-P/SM status. All data would be used in an estimated breeding value programme.

# The Erector Spinae Plane block for intraoperative analgesia in dogs undergoing hemilaminectomy: a retrospective study

**Amanda Herron, Cristina Bianchi,  
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Andrew Foster, Roger Medina**

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## OBJECTIVES

To evaluate retrospectively the erector spinae plane block as part of a multimodal analgesia protocol for dogs undergoing hemilaminectomy, with regards to intraoperative rescue analgesia requirements and clinical safety.

## METHODS

In this retrospective, observational study, anaesthetic records of dogs receiving an ultrasound guided ESP

block with ropivacaine for hemilaminectomy for intervertebral disc extrusion between December 2017 and July 2018 were reviewed. Parameters recorded for the study included: signalment, surgical area, number of discs, premedication, induction agent, volatile agent, heart rate, respiratory rate, blood pressure, percentage of inhalation anaesthetic used and temperature. Any analgesia given intraoperatively was documented and assessed as to whether this was given for rescue analgesia purposes (rescue was given when there was an increase in heart rate and/or blood pressure and/or respiratory rate). Factors affecting the use of rescue analgesia were analysed using binary logistic regression.

## RESULTS

Forty-eight dogs were included in the study. All dogs received 0.2 mg/kg of methadone and nine of them had NSAIDs as premedication. From the 48 dogs, 18 required rescue analgesia. From those 18, 10 required an addition of 0.1 mg/kg methadone, with the other 8 requiring higher levels of rescue analgesia. On the logistic regression, signalment, sedative used, surgical area and number of discs had no effect on the requirements for rescue analgesia. No complications were reported with the use of the ESP block.

## STATEMENT (CONCLUSIONS)

Ultrasound guided ESP can be a simple and safe technique for provision of intraoperative analgesia for patients undergoing hemilaminectomy.

Saturday 6 April  
Faraday Room

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# Ophthalmology

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- 506 08:30–08:45  
**Optimising topical ophthalmic drug delivery in the canine eye by reducing drop volume—preliminary investigations**  
David Williams
- 506 08:45–09:00  
**Difference in prevalence of age-related cataract in dogs in the UK and New Zealand: a consequence of differential ultraviolet light exposure?**  
Alice Prodger
- 507 09:00–09:15  
**Survey of owner attitudes toward the application of eye drops in dogs and cats with ophthalmic disease**  
Sophie Mead
- 507 09:15–09:30  
**Evaluation of the I-PEN, a hand-held device for rapid measurement of tear osmolarity in the canine patient**  
Yuvani Bandara
- 508 09:30–09:45  
**Comparison of behaviour in blind and sighted dogs**  
Helen Inzani
- 508 09:45–10:00  
**A descriptive retrospective study of 11 cases of neurogenic dry eye in a referral population and the response to pilocarpine treatment**  
Michaela Wegg
- 509 10:00–10:15  
**Comparison of intraocular pressure measurement by three tonometers, the TonopenXL, Tonovet and TonovetPlus in the eyes of 50 dogs with a range of normal and abnormal intraocular pressures**  
Natalia Giannakopoulou
- 509 10:15–10:30  
**AI and the eye!**  
David Williams

## Oral presentations

# Optimising topical ophthalmic drug delivery in the canine eye by reducing drop volume—preliminary investigations

David Williams<sup>1</sup>, Florence Clark<sup>2</sup>

- 1 Queen's Veterinary School Hospital, University of Cambridge, Cambridge, United Kingdom
- 2 The Perse School, Cambridge, United Kingdom

## OBJECTIVES

The standard volume of a drop from an ophthalmic bottle is much larger than the volume of the canine tear lake. Previous studies regarding changes in heart rate and blood pressure associated with the use of topical phenylephrine show that trans-conjunctival absorption of topical drops can provoke systemic effects. Here we investigate whether drug delivery can be optimised by reducing drop volume.

## METHODS

Pupils of greyhounds used for clinical teaching were dilated for fundoscopy either using 1% tropicamide from a standard minim vial or from one with a Gilson pipette tip attached to reduce the drop volume. Drop volume was measured by determining drop weight on a micro-balance. Degree of mydriasis was measured photographically and pupil size and time to full dilation were compared for the two delivery methods.

## RESULTS

Volumes of drops from the two delivery devices were  $31.4 \pm 15.0\mu\text{l}$  for the minim single dose dispenser vial and  $10.0 \pm 3.4\mu\text{l}$  from the minim vial with attached pipette tip, these volumes being significantly different at  $p < 0.0001$ . Even though only one third of the volume was dispensed, the degree of maximum dilation (12.1 and 13.0 mm) and time to maximum dilation (60 minutes for both methods) was not significantly different.

## STATEMENT (CONCLUSIONS)

The fact that a drop only one third the volume of one from the standard minim dispenser still gave the same mydriatic effect shows that methods to reduce drop volume should be used to minimise systemic absorption of topically administered drugs. Further work is required to investigate systemic effects of drugs at different drop volumes.

# Difference in prevalence of age-related cataract in dogs in the UK and New Zealand: a consequence of differential ultraviolet light exposure?

Alice Prodger<sup>1</sup>, David Williams<sup>2</sup>

- 1 Ryder and Davies Veterinary Surgeons, Woodbridge, United Kingdom
- 2 Queen's Veterinary School Hospital, University of Cambridge, Cambridge, United Kingdom

## OBJECTIVES

Daylight exposure, and particularly ultraviolet (UV) irradiation, is accepted as an important factor in the genesis of

age-related cataract in humans. Here cataract prevalence in dogs was compared between the UK and New Zealand (NZ) two areas with substantially different levels of UV irradiance.

## METHODS

Data already collected on cataract prevalence for 2000 dogs in the UK was compared with data gathered through ophthalmic examination in this study for 97 dogs in Kaitia, NZ. The age at which 50% of the population had cataract (C50) was calculated for each population and compared with a Chi squared test.

## RESULTS

The age profile of the dogs in both populations was not significantly different ( $p = 0.98$ ) but cataracts occurred at a younger age in NZ dogs (C50 = 7.5 years) compared with those in the UK (C50 = 9.4) these values significantly different at  $p = 0.0047$ . All dogs in the UK population had lens opacity by the age of 13.5 while the comparable figure was 11.5 years in the NZ population.

## STATEMENT (CONCLUSIONS)

Kaitia is located at a latitude of 35.1° South and the UK at 55° North, with total annual hours of sunlight estimated at 2115 for Kaitia and 1374 for the UK and at least twice

the UV irradiance in Kaitaia. Given that other factors such as diet and medical treatment were not significantly different between the two populations, the substantially

earlier onset of age-related cataract in NZ dogs is highly likely to be related to high UV levels associated with depletion in the ozone layer at southern latitudes.

## Survey of owner attitudes toward the application of eye drops in dogs and cats with ophthalmic disease

**Sophie Mead, David Williams**

University of Cambridge, Cambridge, United Kingdom

### OBJECTIVES

Compliance of veterinary clients in administering ophthalmic medication to their pets has received little attention compared to compliance in human medicine. This study aimed to investigate owner attitudes regarding the ease of eyedrop administration.

### METHODS

This study used questionnaire-guided interviews, asking what the temperament and ease of handling of the pet was,

how often owners successfully applied drops, how easy they found it to apply medication (ease score: 1 very easy to 7 not possible), whether they needed help in providing treatment, whether the temperament of their pet had changed during treatment and if so in what manner, whether they had developed techniques to render treatment less stressful and how they felt about treating their pet. A convenience sampling method was used. All respondents gave informed consent to their opinions being evaluated.

### RESULTS

Results from 15 cat owners and 33 dog owners showed an ease score for dogs was  $3.3 \pm 0.4$  and for cats  $4.5 \pm 0.4$  and that temperament was not a predictor of ease of treatment. More compliant owners had more success treating their pets. 64% of dog owners and 93% of cat owners reported negative behavioural changes during treatment, including avoidance, nervousness and aggression. 58% of dog owners and 80% of cat owners associated treating their pets with negative emotions such as stress, worry, nervousness and guilt.

### STATEMENT (CONCLUSIONS)

This study suggests that emotional factors and the impact of the client's relationship with their pet are important factors in compliance to prescribed treatment protocols.

## Evaluation of the I-PEN, a hand-held device for rapid measurement of tear osmolarity in the canine patient

**Yuvani Bandara, David Williams**

Queen's Veterinary School Hospital, Cambridge, United Kingdom

### OBJECTIVES

Previous reports have documented the use of electronic devices to measure tear-film osmolarity but devices such as the TearLab osmometer are cumbersome and expensive to use. Here a handheld solid state electronic diagnostic device for the quantitative measurement of tear-film osmolarity is evaluated for use in canine patients. The disposable tip of the device is held adjacent to the conjunctiva of the lower conjunctival sac and measures the impedance of the tear film

bathing this tissue, calculating tear osmolarity within a few seconds.

### METHODS

Animals assessed included twenty dogs with a normal tear film as diagnosed by ophthalmic examination and a Schirmer tear test (STT) reading over 15 mm/min, and ten dogs with keratoconjunctivitis sicca (KCS), diagnosed by finding of ocular surface pathology characteristic of dry eye and a STT reading of less than 15 mm/min.

### RESULTS

The I-PEN device was easy to use and tolerated well by all animals. Osmolarity was  $331.9 \pm 11.4$  mOsm/L in normal eyes and  $348.9 \pm 18.4$  mOsm/L in eyes with KCS, these values being significantly different from each other ( $p < 0.05$ ).

### STATEMENT (CONCLUSIONS)

This study shows that the IPEN is a useful device to determine tear-film osmolarity in canine patients. Given that high osmolarity is thought to be a key factor in ocular surface pathology in dry eye, determination of tear osmolarity may be valuable in assessment of dogs with KCS.

## Oral presentations

# Comparison of behaviour in blind and sighted dogs

**Helen Inzani, David Williams**

Queen's Veterinary School Hospital, Cambridge, United Kingdom

## OBJECTIVES

Assessing welfare of blind dogs requires an objective evaluation of their behaviour. Here we sought to compare the behaviour of blind and visual dogs to determine which measures would be best to assess their welfare.

## METHODS

The behaviours of twenty blind dogs and twenty matched visual dogs were evaluated by documenting their behaviours at intervals of 30 seconds over a ten minute period in a 10 m by 5 m room. The number of times they were observed performing a specific behaviour (sniffing, tail wagging, standing, sitting, lying, staring, looking around,

interacting with the observer, ear-raising, wandering, whining, growling or barking) was documented. These data were compared for blind and visual dogs. A rating system based on Gosling's cross-species personality traits was used to assess the curiosity, friendliness, playfulness, alertness, aggressiveness of dogs and how alert and attentive, subdued or anxious they appeared to be during the test.

## RESULTS

The only significant differences between blind and visual dogs was in ear raising, tail wagging and looking around, all of which occurred significantly more in visual than blind dogs. No other behaviours were observed to be significantly different in either group. Personality trait assessment suggested that blind dogs were less friendly and more anxious than visual dogs although such an evaluation is substantially more subjective than the evaluation of specific behaviours and so more difficult to use in an objective manner.

## STATEMENT (CONCLUSIONS)

This comparison of behaviours in blind and visual dogs suggests that few behaviour traits are significantly different between blind and visual dogs.

# A descriptive retrospective study of 11 cases of neurogenic dry eye in a referral population and the response to pilocarpine treatment

**Michaela Wegg**

Rowe Referrals-ophthalmology, Bristol, United Kingdom

## OBJECTIVES

To assess the response to pilocarpine in dogs with neurogenic dry eye in a UK referral centre.

## METHODS

A descriptive retrospective study reviewing medical records from dogs with neurogenic dry eye treated with

oral pilocarpine and/or topical pilocarpine (0.1%, four times daily), at a UK referral centre, between 2015 and 2018. Cases were excluded if there were low Schirmer tear test (STT) values bilaterally, if the follow up time was less than thirty days and if surgical measures were undertaken within the first thirty days.

## RESULTS

Medical records from 11 cases, 7 females and 4 males with mean age of 10 years (5y5m to 16y3m) were reviewed. Seven cases (64%) were positive for pilocarpine treatment and return to normal STT (15–25 mm/minute) values after treatment. The average time to normal tear production on treatment was 34 days (range of 15–53 days) and the average time for initial response was 7.7 days (range 2 to 17 days). There was no correlation between xeromycteria (dry nose) and response to pilocarpine treatment. The number of systemic drops until positive response varied between individuals, from 0.8 drops/10 kg, to 7 drops/10 kg. There is individual variation in the dose tolerated systemically and the dose required for a positive response.

## STATEMENT (CONCLUSIONS)

In conclusion, you should trial treatment with pilocarpine for at least 34 days in dogs diagnosed with neurogenic dry eye prior to opting for surgical intervention.



# Comparison of intraocular pressure measurement by three tonometers, the TonopenXL, Tonovet and TonovetPlus in the eyes of 50 dogs with a range of normal and abnormal intraocular pressures

**Natalia Giannakopoulou, David Williams**

University of Cambridge Veterinary School, Cambridge, United Kingdom

## OBJECTIVES

Intraocular pressure (IOP) measurement is important in ophthalmic examinations being achieved by use of applanation tonometers such as the Tonopen or rebound tonometers such as the Tonovet or more recently the Tonovet-plus. Here we seek to determine correlation between iop as measured by these tonometers.

## METHODS

The Tonovet, Tonovet-plus and Tonopen were used to measure iop in eyes of 50 dogs with normal eyes (iop between 10 and 25 mmHg), glaucomatous (iop > 25 mmHg) and uveitic (iop < 10 mmHg) eyes. Comparison of iop values was achieved using analysis of variance (ANOVA).

## RESULTS

Descriptive statistical analysis and ANOVA of measurements for all eyes showed iop values for Tonopen, Tonovet and Tonovet-plus of  $20.0 \pm 11.4$ ,  $22.2 \pm 12.8$  and  $25.7 \pm 14.2$  mmHg, an f-ratio value of 2.52 and p of 0.084. For the 20 eyes with uveitis the iop measures were  $9.85 \pm 3.39$ ,  $10.45 \pm 4.54$  and  $13.65 \pm 5.01$  mmHg and the f-ratio value was 4.4 at p < 0.05. For the 36 glaucomatous eyes iop measures were  $43.89 \pm 12.11$ ,  $47.72 \pm 14.38$  and  $52.86 \pm 15.53$  mmHg with an f-ratio value of 3.68 at p < 0.05. For the 42 normal eyes iop measures were  $16.93 \pm 2.53$ ,  $18.69 \pm 3.34$  and  $21.26 \pm 3.28$  mmHg with f-ratio value of 21.1 and significance at p < 0.0001. In all cases iop measured higher using the Tonovet-plus than the Tonovet with the Tonopen providing the lowest measurements.

## STATEMENT (CONCLUSIONS)

That different tonometers give different iop values does not invalidate any particular device; correlation with manometric measurement is the only method of determining measurement validity. Measurement with different tonometers did not change a diagnosis of glaucoma or uveitis, however this study does show that comparisons between tonometers is not appropriate.

# AI and the eye!

**David Williams, Richard Dybowski**

Department of Veterinary Medicine, University of Cambridge, Cambridge, United Kingdom

## OBJECTIVES

The rise of artificial intelligence (AI) in medical diagnosis has been rapid—a PubMed search of ‘artificial intelligence, clinical diagnosis and medicine’ gave 7225 results. Veterinary medicine has not been as quick on the uptake. A similar PubMed search in veterinary medicine gives only 22 relevant publications. Yet the use of pattern recognition and flowchart methodology renders veterinary diagnosis quite as amenable to computer-aided modelling as is human medicine. Here we sought to develop an AI system for the diagnosis of the causes of canine red eye.

## METHODS

An AI system for diagnosis that can run on a standard laptop was developed by clinical veterinary ophthalmologists

in conjunction with researchers in mathematics and computational biology.

## RESULTS

The AI system developed is based on a Bayesian network in which each node of the network corresponds to an attribute of interest e.g., ‘breed’, ‘disease’, ‘intraocular pressure’. An arrow from one node to another indicates that the value taken by one node influences the value taken by the other; thus, ‘breed’ > ‘disease’ indicates that the probability of a dog having a particular disease is influenced by the breed. ‘disease’ > ‘intraocular pressure’ indicates that the probability a particular level of intraocular pressure is influenced by which disease is present. The network enables clinicians to evaluate which disease is likely to be manifest by specific clinical signs observed and allows students to learn the probabilistic causal relationships between eye diseases and their clinical signs.

## STATEMENT (CONCLUSIONS)

This system illustrates the value of AI in clinical diagnosis and veterinary education.



Saturday 6 April  
Faraday Room

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# Therapeutics and orthopaedics

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- 512 10:50–11:05  
**Development of an information booklet for small animal pain management clinic clients**  
Tate Preston
- 512 11:05–11:20  
**Acetabular fractures in 30 dogs: presentation, classification and management and short-term outcome**  
Victoria Roberts
- 513 11:20–11:35  
**Retrospective study of occurrence and types of complications associated with different procedures to correct traumatic hip luxation in 44 dogs**  
Aaron Lutchman
- 513 11:35–11:50  
**The effectiveness of marine based fatty acid compound (PCSO-524) alone and combined with Previcox in the treatment of canine osteoarthritis**  
Brian Beale
- 514 11:50–12:05  
**Vertical mandibular range of motion and mandibular length ratio as a non-invasive tool for assessment of temporomandibular joint function in dolicho and brachycephalic dogs under anaesthesia: 9 breeds, 111 dogs**  
Olivia Oginska
- 514 12:05–12:20  
**Accuracy of medial to lateral transcondylar screw placement using a C-guide for the treatment of humeral intracondylar fissure**  
Maite Pardo
- 515 12:20–12:35  
**Outcome's and complication's associated with standard elbow arthrodesis**  
Brian Crowley
- 515 12:35–12:50  
**Measuring the impact of regenerative medicine (RM) on chronic degenerative conditions in dogs, using a validated owner-reported outcome measure (VetMetrica) which provides scores in 4 domains of health-related quality of life (HRQL)**  
Andrew Armitage

## Oral presentations

### Development of an information booklet for small animal pain management clinic clients

**Tate Preston, Ian Self**

The University of Nottingham, Nottingham, United Kingdom

#### OBJECTIVES

Ascertain from veterinary clients what information would be useful in the management of their dog's pain.

Produce an information booklet based on this information.

Subsequently improve the welfare of pet dogs presented with painful conditions to veterinary surgeons.

#### METHODS

Semi-structured interviews were held with clients attending a referral pain clinic and a hydrotherapy centre regarding what information would be useful for them

and their attitudes towards dog pain. Interviews were recorded and results analysed using NVivo (qualitative data analysis software). A booklet was produced answering the main questions raised by the owners, together with background information provided by veterinary analgesia specialists.

#### RESULTS

166 codes were generated from 7844 references from which 6 themes were identified; Variety of treatment options, Dog pain is comparable to human pain, Not being normal shows the dog is in pain, Owner responsibility, Trust, Understanding your dog and its pain.

Pain Treatment was mentioned 652 times (the highest number of references).

#### STATEMENT (CONCLUSIONS)

Participants believe a combination of treatments work best including therapies, pharmaceuticals, surgery and environmental management. Owners feel a responsibility as advocates of their dog's quality of life. Owners need to be able to trust their vet/professional when treating and making decisions about their dog's pain, this includes knowing that they are competent. People want to be able to understand the signs of pain or lack of signs that their dog shows, they understand that dogs cannot communicate pain the same way as humans do.

### Acetabular fractures in 30 dogs: presentation, classification and management and short-term outcome

**Victoria Roberts, Richard Meeson**

Royal Veterinary College, London, United Kingdom

#### OBJECTIVES

To describe the presentation, classification, management and short-term outcome of dogs with acetabular fractures.

#### METHODS

Retrospective analysis of the clinical data of dogs with at least one acetabular fracture between January 2010 and March 2018.

#### RESULTS

30 dogs with 32 radiographically confirmed acetabular fractures met inclusion criteria, of which 27 had confirmed/

suspected vehicular trauma. Mean age was 34 months (range: 5–120), mean weight was 10.7 kg (range: 2.66–27.55), 14/30 were entire, 17/30 were female.

The majority were unilateral (28/32) and simple (19/32). Most commonly seen in the mid (20), or caudal acetabulum (10), rarely in the cranial quadrant (2). 28/30 had additional orthopaedic injuries and 2 were euthanised due to co-morbidities. 22/32 underwent surgical stabilisation; acetabular plate (AP)(n = 8), femoral head and neck excision (FHNE)(n = 5), screws, wires and polymethylmethacrylate (SW-PMMA)(n = 3), dynamic compression plate (n = 1), AP and SW-PMMA (n = 1), FHNE and locking compression plate (n = 1), AP and wire (n = 1), FHNE and wire (n = 1), screws and wire (n = 1). 8/32 were managed conservatively, with 4 undergoing other pelvic surgery. 27 dogs (28 fractures) survived to discharge. 18 dogs had follow-up with 11 lameness scores recorded, mean 3.7/10 (range: 0–10). 15 fractures had radiographs after 28 days, all showed evidence of bone healing. Complications seen were: 1 had FHNE 9 days post-operatively due to subsequent coxofemoral luxation, 1 acetabular plate failed not requiring revision surgery.

#### STATEMENT (CONCLUSIONS)

Canine acetabular fractures commonly occur secondary to vehicular trauma and are usually unilateral, simple and occupy the mid or caudal acetabulum. The majority were surgically managed and complications were rare.

# Retrospective study of occurrence and types of complications associated with different procedures to correct traumatic hip luxation in 44 dogs

**Aaron Lutchman, Pilar Lafuente**

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## OBJECTIVES

Retrospective, observational and analytical study assessing the demography of traumatic hip luxation in dogs and the complications associated with different correction techniques. This study aims to assess whether certain techniques are superior with regard to outcomes, associated complications and the respective complication rate.

## METHODS

The cases of animals with unilateral or bilateral luxation of the coxo-femoral joint as a result of trauma between 2009 and 2018 were reviewed. Signalment, clinical signs, treatment type (closed reduction, closed reduction followed by surgical reduction and stabilization, or immediate surgical reduction and stabilization), outcome and complications were recorded for each patient. Statistical evaluation was performed to identify relationships between treatment type and outcome or rate of complications.

## RESULTS

Forty-four dogs were included in the study. Mean age was 4 years (range 3 months–12 years) with a mean weight of 19 kg (range 4–48 kg). Road traffic accidents ( $n = 17$ ) and animals exercising ( $n = 8$ ) were the most common causes of traumatic luxation. Seven surgical procedures were represented in this data set, the most common being ilio-femoral suture. Closed reduction was attempted primarily in 33/44 cases however a significant proportion of these cases re-luxated ( $n = 24$ ), requiring further surgical correction. Complication of re-luxation post-surgical reduction was notably less ( $n = 4$ ). Post surgical infection was uncommon, recorded in ( $n = 2$ ) cases.

## STATEMENT (CONCLUSIONS)

Given the increased rate of re-luxation in animals managed with closed reduction it could be suggested that surgical intervention is warranted as the primary course of treatment.

# The effectiveness of marine based fatty acid compound (pcso-524) alone and combined with previcox in the treatment of canine osteoarthritis

**Brian Beale**

Gulf Coast Veterinary Specialists, Houston, USA

## OBJECTIVES

The purpose of this study is to assess the effectiveness of a marine-based fatty acid compound alone and in

combination with firocoxib for treatment of osteoarthritis-associated pain in dogs using objective measures of limb use and validated subjective assessments.

## METHODS

A double-blinded randomized prospective clinical trial was performed with 31 dogs. Dogs were randomly allocated to a PCSO-524 group (PCSO) or a Firocoxib + PCSO-524 (FCX-PCSO) group. Owners were masked to use of firocoxib by using identical placebo tablets in the PCSO-524 group. Force plate gait analysis and the owner-completed Canine Brief Pain Inventory tool were used to evaluate patients at 0, 2 and 4 weeks. Data were analyzed using repeated measurement analysis with significant level set a 5% ( $\alpha = 0.05$ ).

## RESULTS

Peak Vertical Force (PVF) values were significantly increased over baseline at week 2 and week 4 in both groups ( $p < 0.05$ ). A significant decrease in the CBPI scores (improvement) was seen at week 2 and 4 in the PCSO

## Oral presentations

group and week 4 in the FCX+PCSO group compared with pre-treatment values. No differences were seen between the groups. Pearson Correlation Coefficients demonstrated negative correlation between PVF and CBPI ( $R = -0.335$ ,  $p = 0.001$ ).

## Vertical mandibular range of motion and mandibular length ratio as a non-invasive tool for assessment of temporomandibular joint function in dolicho and brachycephalic dogs under anaesthesia: 9 breeds, 111 dogs

**Olivia Oginska, Miguel A Solano**

Fitzpatrick referrals, Godalming, United Kingdom

### OBJECTIVES

To establish a reliable reference in assessment of the temporomandibular joint (TMJ) function using a user-friendly instrument in order to improve the diagnostics of TMJ disorders and monitor response to surgical and non-surgical management of TMJ disease in dog. Furthermore, to observe the influence of skull conformation

### STATEMENT (CONCLUSIONS)

These data suggest that marine-based PCSO-524 alone, and the combination of firocoxib and PCSO-524 are equally beneficial in treating dogs with osteoarthritis, but patients, may have a lower risk of side effects with PCSO-524.

(dolicho- and brachycephalic) and body weight on vertical mandibular range of motion and mandibular length.

### METHODS

Prospective study focused on measuring vertical mandibular range of motion (vmROM) and mandibular length using a caliper in 111 anesthetized dogs, undergoing various surgical procedures unrelated to TMJ, representing nine phenotypically different breeds, both dolicho- and brachycephalic: Labrador Retrievers, Border collies, Dachshunds, English Springer Spaniels, German Shepherd Dogs, Staffordshire Bull Terriers, French Bulldogs, Pugs and Rottweilers. The ratio between vmROM and mandibular length (mandibL) was calculated for each patient.

### RESULTS

Differences in measured parameters were found among certain breeds, ex. in Rottweilers—mean vmROM 132.75 mm, mandibL 139.5 mm, whereas in Pugs - 68.09 mm and 76.9 mm respectively. Despite those differences, the vmROM/mandibL ratio was similar: 0.93 in dolicho- and 0.94 in brachycephalic breeds with minimal variations ( $\pm 0.06$ ). A significant correlation was found between body weight and both vmROM and mandibL, with correlation of 0.696 and 0.791 ( $p$ -value  $< 0.01$ ) respectively.

### STATEMENT (CONCLUSIONS)

The ratio vmROM/mandibL is a potential reliable and simple tool to assess TMJ disease. It can help guiding the need for advanced imaging and may improve TMJ disorders detectability. Using the ratio may facilitate TMJ post-surgical outcome assessment and rehabilitation progress with a simple instrument.

## Accuracy of medial to lateral transcondylar screw placement using a C-guide for the treatment of humeral intracondylar fissure

**Maite Pardo, Andy Morris, Fabio Frazzica, Duncan Barnes**

Eastcott Referrals, Swindon, United Kingdom

### OBJECTIVES

To retrospectively compare the position of transcondylar screws on post-operative Computed Tomography (CT) scans with the ideal position planned using a previously defined technique.

### METHODS

A retrospective study of 24 elbows of 18 dogs treated for humeral intracondylar fissures, using a 4.5 mm screw inserted from medial to lateral. Humeral condyle diameter was measured from the CT. Planned entry and exit points of the transcondylar screw were 0.3 x humeral condyle diameter cranial and 0.2 x humeral condyle diameter distal to the medial epicondyle and 0.3 x humeral condyle diameter cranial and 0.3 x humeral condyle diameter distal to the lateral epicondyle. Following a medial approach, a C-shaped drill guide was used

to drill a pilot hole from the medial entry point to the lateral exit point. A post-operative CT scan was performed to determine successful placement of the screw within the humeral condyle and to assess:

- Distance of achieved entry and exit points from the planned entry and exit points
- Angular deviation from planned screw axis

## RESULTS

All screws were completely within the humeral condyle. Mean distance between the planned entry point and the

achieved entry point was 0.58 mm cranially and 1.26 mm distally. Mean distance between the planned exit point and the achieved exit point was -0.02 mm cranially and 0.51 mm distally. Mean maximum screw angular deviation was 5.7°.

## STATEMENT (CONCLUSIONS)

Use of CT planning and a C-guide allowed the accurate placement of transcondylar screws from medial to lateral via a medial surgical approach.

# Outcome's and complication's associated with standard elbow arthrodesis

**Brian Crowley, Noel Fitzpatrick**

Fitzpatrick Referrals, Godalming, United Kingdom

## OBJECTIVES

To report the surgical management of end stage developmental disease (DJD) by arthrodesis following failure of previous surgical intervention.

## METHODS

Retrospective case series from historical clinical records. Data collected included signalment, primary surgical technique, mode of failure, revision surgical technique, preoperative and postoperative radiographic findings,

complications, owner assessment and veterinary assessment.

## RESULTS

23 elbows from 21 dogs were included, bodyweight range 1.9 kg–48.9 kg. All surgeries performed in the same centre by 5 different surgeons. All elbows were considered end stage due to failure of joint replacement, congenital/traumatic malformations and progression of aggressive osteoarthritis (OA). All elbows underwent arthrodesis as a salvage procedure. 13 complications occurred in 10 elbows (43.5%) including surgical site infection (SSI), seroma, screw breakage, plate removal and amputation. Outcome data was available for all 22 elbows. An excellent outcome was seen in 3 (13.6%) elbows, good in 10 (45.5%) elbows, acceptable in 7 (31.8%) elbows and unacceptable in 2 (9.1%) elbows.

## STATEMENT (CONCLUSIONS)

Persistent lameness and pain associated with treating advanced elbow DJD by joint resurfacing/replacement surgery in an attempt to salvage limb function is an ongoing putative challenge. Surgical revision by elbow arthrodesis, while technically challenging may show potential in regaining or improving limb function and may contribute to overall improvement in reported quality of life.

# Measuring the impact of regenerative medicine (RM) on chronic degenerative conditions in dogs, using a validated owner-reported outcome measure

# (VetMetrica) which provides scores in 4 domains of health-related quality of life (HRQL)

**Andrew Armitage<sup>1</sup>, Jacky Reid<sup>2,3</sup>**

1 Greenside Veterinary Practice, St Boswells, United Kingdom

2 NewMetrica Ltd, Glasgow, United Kingdom

3 University of Glasgow, Glasgow, United Kingdom

# Oral presentations

## OBJECTIVES

RM is a relatively new treatment modality with the potential to control pain and inflammation, improve mobility and reverse degeneration in osteoarthritis (OA) and associated soft tissue pathologies (STP). Treatment with stem cell therapy (SCT) and platelet rich plasma (PRP) in dogs with OA and associated STP was investigated with a view to demonstrating an improvement in HRQL.

## METHODS

Owners of dogs with chronic OA and STP, non – responsive to conservative management, were recruited and requested to complete HRQL assessments online before treatment (baseline) and at set intervals after treatment with RM. Group mean and 95% confidence intervals at all time points and significance between baseline and 6–8 weeks and 14–16 weeks using paired T-test was calculated.

## RESULTS

Owners of 28 dogs completed a baseline assessment and of these owners 23 and 12 completed assessments after treatment at 6–8 weeks and 14–16 weeks respectively. Significant improvement at 6–8 weeks and 14–16 weeks relative to baseline in HRQL domains energetic/enthusiastic ( $p = 0.02$  and  $p = 0.03$ ), happy/content ( $p = 0.008$  and  $p = 0.01$ ) and active/comfortable ( $p = <0.001$  and  $p = 0.002$ ) was demonstrated. There was no significant improvement in calm/relaxed at either timepoint ( $p = 0.3, 0.61$  respectively)

## STATEMENT (CONCLUSIONS)

This study demonstrated a significant improvement in 3 of 4 HRQL domains in dogs with OA and associated STP, treated with SCT and PRP. RM should be considered as an effective minimally invasive treatment option where conservative management has failed.



Saturday 6 April  
Faraday Room

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# Orthopaedics

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- 518 14:30–14:45  
**An investigation into clients' perception of physiotherapy for dogs after cranial cruciate ligament rupture (CCLR) surgery**  
Stephanie Lau
- 518 14:45–15:00  
**Comparison of perioperative (0–3 months) complications and outcomes in dogs weighing  $\geq 15$  Kg with bilateral medial patellar luxation undergoing single-session bilateral corrective surgery with staged historical control surgeries: 14 cases (28 stifles)**  
Gary Campbell
- 519 15:00–15:15  
**Bilateral locking-compression plate fixation for stabilization of canine Y-T humeral fractures**  
Javia Garcia
- 519 15:15–15:30  
**Current perceptions of minimally invasive osteosynthesis techniques in small animal orthopaedic practice**  
William Robinson
- 520 15:30–15:45  
**"If it looks straight, it is straight?"—establishing the normal axes and joint angles in small breed dog**  
Ben Mielke
- 520 15:45–16:00  
**Double locking plates and screw fixation after tibial plateau leveling osteotomy: effect on postoperative infection rate in dogs over 50 kg**  
Jayson Tuan
- 521 16:00–16:15  
**Gait analysis of lameness-free dogs: experience with a Tekscan pressure-sensitive walkway system**  
James Miles
- 521 16:50–17:05  
**Complications and outcomes following feline dorsal pantarsal arthrodesis using a pre-contoured plate in 32 cats (2010–2018)**  
Nuria Comas
- 522 17:05–17:20  
**Outcomes of 17 talar ridge replacements using a medial malleolar osteotomy approach for the treatment of osteochondritis dissecans in 10 dogs**  
Sarah Austin
- 523 17:20–17:35  
**Presentation, treatment and outcome of fractures in pet rabbits (*Oryctolagus cuniculus*)**  
Sofia Garcia-Pertierra

## Oral presentations

### An investigation into clients' perception of physiotherapy for dogs after cranial cruciate ligament rupture (CCLR) surgery

**Stephanie Lau<sup>1</sup>, JC Alves<sup>1,2</sup>, Pilar Lafuente<sup>1</sup>**

<sup>1</sup> Royal Veterinary College, London, United Kingdom

<sup>2</sup> Guarda Nacional Republicana (Portuguese Gendarmerie), Lisbon, Portugal

**THIS ABSTRACT HAS BEEN WITHDRAWN BY THE AUTHOR**

Comparison of perioperative (0–3 months) complications and outcomes in dogs weighing  $\geq 15$  Kg with bilateral medial patellar luxation undergoing single-session bilateral corrective surgery with staged historical control surgeries: 14 cases (28 stifles)

**Gary Campbell, Miguel A Solano, Noel Fitzpatrick**

Fitzpatrick referrals, Godalming, United Kingdom

#### OBJECTIVES

To describe the surgical management, peri-operative (0–3 months) complication rates and clinical outcomes of dogs weighing 15 kg or more with bilateral medial patellar luxation (MPL) undergoing bilateral repair during a single anaesthetic episode.

#### METHODS

Medical records of dogs undergoing single-session bilateral MPL repair during an eight-year period (2006–2014) were analysed retrospectively and compared to paired controls of similar body weight and patella luxation grade, undergoing staged repair of bilateral MPL during the same time period. Each group consisted of seven dogs (14 stifles).

#### RESULTS

The minor complication rate for single session bilateral repair was 0%. The major complication rate was 29% (4/14 stifles) which was due to one case with surgical site infection and another with surgical wound breakdown

and implant loosening. The minor complication rate for staged repair was 43% (6/14 stifles) due to three cases of patellar tendonitis, two of MPL recurrence and one of pin breakage. The major complication rate was 0%. No catastrophic complications were experienced. All stifles in the single session group and 12 stifles in the staged group had full function at final post-operative examination. The two remaining stifles had acceptable function.

## STATEMENT (CONCLUSIONS)

Based on our study, single session bilateral MPL repair is feasible in dogs weighing 15 kilograms or more but led to an increased rate of major complications when compared with animals undergoing staged bilateral repair. These complications did not affect perioperative outcome with all animals in the single session group returning to full function at 6–12 weeks post-operatively.

# Bilateral locking-compression plate fixation for stabilization of canine Y-T humeral fractures

**Javier Garcia, Miguel A Solano, Russell Yeadon**

Fitzpatrick referrals, Godalming, United Kingdom

## OBJECTIVES

To report the surgical management, complications and outcomes for dogs with humeral Y-T fractures stabilized with medial and lateral Locking Compression Plates (LCP).

## METHODS

Medical records of 28 dogs presented with 29 consecutive Y-T fractures approached bilaterally, reduced and stabilized using a transcondylar and two or three LCP locking plates were reviewed. All dogs had at least six

weeks clinical follow-up and, for some, long-term owner's-based outcome with LOAD questionnaire was obtained.

## RESULTS

Twenty-eight dogs (twenty-nine fractures) met the inclusion criteria. Most commonly affected breeds were French Bulldog (n = 7) and English Cocker Spaniel (n = 4). Age at presentation ranged from 4 months to 9.5 years (mean 43.53 months), seven dogs (25%) were considered skeletally immature. In twelve dogs, the fracture was consequence of a high-energy trauma and in sixteen dogs of gentle activity. Twenty-seven (96.4%) dogs were considered to have resolution of lameness at 6 weeks follow-up. Complications were registered in two cases; one major complication required surgical revision and one dog (3.5%) showed a catastrophic complication leading to amputation. Mid and Long-term follow-up was available for twenty-one cases (75%), mean of 798 days (range from 180 to 1582 days). Fourteen (71%) owners classified their dogs' mobility as very good and five owners (23%) found it good.

## STATEMENT (CONCLUSIONS)

Based on our study, management of Y-T humeral fractures with bilateral LCP plates and transcondylar screw leads to low complication rate and good to excellent clinical outcome.

# Current perceptions of minimally invasive osteosynthesis techniques in small animal orthopaedic practice

**William Robinson, Kevin Parsons, Toby Knowles**

Bristol Veterinary School, Bristol, United Kingdom

## OBJECTIVES

To report the current perceptions of minimally invasive osteosynthesis techniques in a population of veterinary orthopaedic surgeons.

## METHODS

Two electronic questionnaires were created using the Bristol Online Survey tool. The first contained questions addressing multiple aspects of minimally invasive osteosynthesis (MIO) and the second specifically focussed on minimally invasive plate osteosynthesis (MIPO). This was circulated amongst members of the European College of Veterinary Surgeons (ECVS) and the Veterinary Orthopaedic Society (VOS). Responses were collected between February and May 2018.

# Oral presentations

## RESULTS

There were 257 and 238 respondents to the two surveys respectively. The most common canine fracture addressed with MIO techniques were tibial fractures. The most frequently stated advantages of MIO were faster healing time (26%) and less post-operative pain (20%). The most commonly stated disadvantages of MIO techniques were need for new equipment (27%) and challenges to achieving adequate fracture reduction (18%). When considering MIPO specifically 71% of respondents stated that they performed MIPO rarely or occasionally. 151 respondents (63%) were keen to perform more MIPO than their current level. The most common fracture

stabilised with MIPO in both cats and dogs were tibial fractures. MIPO was less commonly performed in cats than dogs (39% vs 15%). 24% of respondents stated that there were not enough MIPO training opportunities.

## STATEMENT (CONCLUSIONS)

This study demonstrated recognition of the benefits of MIO and MIPO techniques amongst veterinary orthopaedic surgeons. Despite this there remains limitations to its application within clinical practice and the study has highlighted areas for further development to improve its use clinically.

## "If it looks straight, it is straight?"—establishing the normal axes and joint angles in small breed dog

**Ben Mielke, Pilar Lafuente**

Queen Mother Hospital for Animals, Royal Veterinary College, Hertfordshire, United Kingdom

## OBJECTIVES

Angular limb deformities are difficult cases to manage. When animals are bilaterally affected having a normal reference value for joint axes and angles ensures optimal patient outcome through preoperative management. Although this has been established for medium-large breed dogs no such values exist in small dogs. The purpose of this study was to establish the normal anatomic axis of the canine radius in the frontal and sagittal planes, in a population of adult small breed dogs

## METHODS

Radiographs of the antebrachium in skeletally mature small breed dogs were reviewed from the electronic database of the hospital. Radiographs were used to determine normal ranges of frontal and sagittal plane anatomic axes and relevant angles; aMPRA, aLDRA, aPCRA, aDCdRA, procurvatum and frontal plane angle.

## RESULTS

28 dogs met the inclusion criteria. Mean  $\pm$  SD reference ranges for these dogs were aMPRA  $80.5^\circ \pm 2.7$ , aLDRA  $85.2^\circ \pm 2.1$ , aPCRA  $88.7^\circ \pm 2.9$ , aDCdRA  $82.8^\circ \pm 3.1$ , Procurvatum  $19.8^\circ \pm 5.2$ .

## STATEMENT (CONCLUSIONS)

Ranges for normal canine radial axis in small breed dogs are similar to those previously reported for Labradors and medium-large breed dogs. These reference ranges can be used for management and preoperative planning of small-breed dogs with antebrachial growth deformities, when a bilateral condition prevents the use of the opposite limb as a reference.

Abbreviations: aMPRA – anatomical edial proximal radial angle, aLDRA – anatomical lateral distal radial angle, aPCRA – anatomical proximal caudal radial angle, aDCdRA – anatomical distal caudal radial angle

## Double locking plates and screw fixation after Tibial Plateau Leveling Osteotomy: effect on postoperative infection rate in dogs over 50 kg

**Jayson Tuan, Miguel A Solano**

Fitzpatrick referrals, Godalming, United Kingdom

## OBJECTIVES

To investigate and analysis the effect of double locking plates and screw fixation (DLP) in dogs >50 kg undergoing tibial plateau leveling osteotomy (TPLO) on postoperative infection rate.

## METHODS

This is a retrospective study using medical records (January 2003–October 2017) from a single orthopaedic referral hospital. The inclusion criteria were body weight >50 kg and a DLP or standard locking plate and screw fixation (LP) or conventional non-locking plate and screw fixation (NLP) was used. Logistic regression analysis evaluated for associations with infection occurrence.

## RESULTS

275 dogs were included for the study and postoperative antibiotics were dispensed to 168 (61.1%) dogs. NLP was used in 114 (41.5%), LP in 128 (46.5%) and DLP in 33 (12%) dogs. Postoperative infection was diagnosed in 48 (17.5%) dogs. Dogs with NLP, LP, and DLP had postoperative infection rates of 24.5%, 13.3%, and 9.1%, respectively. The usage of a locking construct and postoperative antibiotic therapy were associated with significant reductions in postoperative infection. A non-locking construct increased and postoperative antibiotics

decreased the risk of infection by 2.08 and 2.37 times, respectively.

However, DLP did not result in a statistically significant reduction in infection.

## STATEMENT (CONCLUSIONS)

A locking construct and postoperative antibiotic therapy significantly reduced the risk of postoperative infections in dogs >50 kg undergoing TPLO. Further investigations are required to determine if the use of DLP could be justified in this cohort of dogs.

# Gait analysis of lameness-free dogs: experience with a Tekscan pressure-sensitive walkway system

**James Miles, Michelle Nielsen, Amalie Mouritzen, Tenna Pedersen, Lise Nikolic Nielsen, Anne Vitger, Helle Harding Poulsen**

Department of Veterinary Clinical Sciences, University of Copenhagen, Copenhagen, Denmark

## OBJECTIVES

To define reference intervals and investigate repeatability for key gait parameters in a lameness-free canine population using a pressure-sensitive walkway (PSW) system.

## METHODS

Following institutional ethical approval, 40 healthy client-owned dogs of various breeds weighing 15–40 kg and

between 2–6 years old were recruited. Orthopaedic pathology was ruled out by clinical examination and using validated owner questionnaires. Six valid trials (3 in each direction) were obtained using a 2 m by 0.46 m PSW (Tekscan 5101E-VH4), equilibrated daily and calibrated weekly. For a valid trial, all paws had to contact the PSW for two or more consecutive strides, with a constant velocity of 0.9–1.1 m/s, while walking with a loose leash without overt head movements. Measurements were repeated for 10 dogs on a different day. Symmetry indices for key gait parameters were derived and reference intervals for these created from bootstrapped 2.5% and 97.5% percentiles.

## RESULTS

Stance time, stride length and peak vertical force reference intervals were typically under  $\pm 10\%$ , and narrower for forelimbs than hindlimbs. Coefficient of variation for repeated measurements was typically under 10%. Direction of travel had statistically significant, but clinically unimportant effects, on several gait parameters.

## STATEMENT (CONCLUSIONS)

Pressure-sensitive walkway data are repeatable and show relatively little variation, such that deviations beyond reference intervals may permit identification and monitoring of lameness in clinical patients. Pressure-sensitive walkways may be useful in assessing clinical gait profiles and monitoring response to treatments such as surgery or physiotherapy.

# Complications and outcomes following feline dorsal pantarsal arthrodesis using a pre-contoured plate in 32 cats (2010–2018)

**Nuria Comas, Miguel A Solano, Noel Fitzpatrick**

Fitzpatrick referrals, Godalming, United Kingdom

## OBJECTIVES

To report the clinical perioperative (0–3 months) outcome and complications of pantarsal arthrodesis (PTA) with dorsal plating in 32 cats without postoperative external coaptation, and to report long-term outcome based on owner's perception with the Feline Musculoskeletal Pain Index (FMP) questionnaire.

# Oral presentations

## METHODS

Medical records of cats undergoing dorsal pantarsal arthrodesis using a feline pre-contoured dorsal PTA plate (Feline Dorsal Pantarsal Arthrodesis Plate; Veterinary Instrumentation) performed in a single referral veterinary hospital between January 2010 and April 2018 were analysed. Clinical and radiographic assessment were performed perioperatively (0–3 months) and the FMP questionnaire was used to evaluate owners' perceptions of outcome with a minimum of 6 months follow-up.

## RESULTS

32 cats met the inclusion criteria. 11 patients had complications (34%): 2 mild (6%), 7 major (2 medical; 7 surgical)

(22%) and 2 catastrophic (6%). Among all the complications, skin wounds and infection ( $n = 5$ ), swelling ( $n = 1$ ), implant loosening or breaking ( $n = 3$ ), lameness ( $n = 3$ ) and plantar necrosis ( $n = 1$ ) were seen. Radiographic recheck at 4–12 weeks after surgery showed good progression of arthrodesis. Good clinical progression was seen at the last recheck for 91% of cats. Twenty owners answered the FMP questionnaire a mean of 35 months (min 7–max 82) with good to excellent outcomes.

## STATEMENT (CONCLUSIONS)

Based on our results, pantarsal arthrodesis using dorsal specifically designed pre-countoured plate without external coaptation is a suitable method to treat tarsal and distal tibial/fibular lesions in cats.

# Outcomes of 17 talar ridge replacements using a medial malleolar osteotomy approach for the treatment of osteochondritis dissecans in 10 dogs

**Sarah Austin, Noel Fitzpatrick**

Fitzpatrick Referrals, Easing, United Kingdom

## OBJECTIVES

To report short to long term outcomes in dogs with medial talar ridge osteochondritis dissecans (OCD) treated with a talar ridge replacement (TRR) via a medial malleolar osteotomy approach.

## METHODS

Data of dogs treated with a custom made TTR fitted via a medial malleolar osteotomy approach were retrospectively

sourced from medical records at a single referral hospital. A graded outcome was assigned from clinical exam at last known recheck. Follow up intervals vary from long term (742 days post operative) to more recent cases (41 days). The outcomes are classified as one (excellent) no lameness, two (good) mild lameness after exercise, three (fair) mild to moderate lameness but consistent weight bearing, four (catastrophic) requiring arthrodesis, amputation or euthanasia.

## RESULTS

Of the ten dogs, seven had bilateral OCD lesions with staged or concurrent bilateral TRR performed and four had unilateral. Overall outcomes were excellent in seven TRR's and good in ten. Long term data (12–24 months) showed four TRR's with excellent and one with good outcomes. Median term data (6–12months) showed four with good outcomes and short term (less than 6 months) showed three TRR's with excellent and five with good outcomes.

## STATEMENT (CONCLUSIONS)

Talar ridge replacement via a medial malleolar osteotomy presents a surgical option with good to excellent outcomes for the management of OCD of the medial talar ridge. Encouragingly these outcomes are sustained into long term follow up.

# Presentation, treatment and outcome of fractures in pet rabbits (*Oryctolagus cuniculus*)

**Sofia Garcia-Pertierra, John Ryan, Jenna Richardson, Emma Keeble, Kevin Eatwell, Dylan Clements**

Royal (Dick) School of Veterinary Studies and Roslin Institute, Edinburgh, United Kingdom

## OBJECTIVES

To identify the incidence, aetiology, characteristics, assessment, management and outcome of bone fractures in rabbits presenting to a single institution.

## METHODS

Medical records of pet rabbits diagnosed with fractures over a twelve-year period were analysed. Patient signalment, insurance status, case type (first opinion/referral), fracture aetiology, fracture location, fracture description, time from fracture occurrence to veterinary presentation,

fixation method, post-operative complications, clinical outcome and follow-up were recorded.

## RESULTS

Forty rabbits that sustained forty-two fractures were included in the study (femoral (n = 12), tibial (n = 6), spinal (n = 6), metacarpal/metatarsal (n = 5), mandibular (n = 4), radius and ulna (n = 4), tarsal (n = 3), and pelvic (n = 2)). Twenty-four fractures had no identifiable cause, seventeen were traumatic and one was infectious. Only one fracture was open. Surgical stabilisation was performed in twenty-two fractures (external skeletal fixation (ESF) and intramedullary pinning (IMP) (n = 9), bone plating (n = 5), ESF (n = 3), IMP (n = 1), K-wire (n = 2), screws (n = 2)), nine were non-surgically managed, eight were euthanased (including all spinal fractures) and three had one limb amputated. Postoperative complications occurred in twelve cases (major (n = 9), minor (n = 3)). Overall twenty-five cases made a functional recovery, eleven were euthanased and six underwent limb amputation.

## STATEMENT (CONCLUSIONS)

Fractures in rabbits are typically closed, diaphyseal fractures without an obvious aetiology. The majority of the rabbits treated achieved a functional recovery, although postoperative complication rate was high. Plate fixation did not appear to result in worse outcomes than ESF. The most commonly reported reasons for euthanasia or amputation were a poor prognosis or outcome.





## Section VI

# Clinical abstracts: poster presentations

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# Management of gastro-oesophageal reflux and regurgitation during anaesthesia in a dog, using a supraglottic airway device (SGAD) with an integrated oesophageal drain

**Ivan Crotaz**

Kynoch Vets, Bracknell, United Kingdom

## OBJECTIVES

Gastro-oesophageal reflux and regurgitation are common and serious anaesthetic complications in dogs. Supraglottic airway devices (SGADs) form a seal over the larynx. The device tip enters the oesophagus and incorporates an oesophageal drainage tube to channel regurgitate away from the airway.

This case study describes the first use of a species specific dog SGAD with an anaesthetic case in which a high volume regurgitation event occurred.

## METHODS

A 26kg male Staffordshire Bull Terrier was undergoing general anaesthesia for a neutering procedure. Informed consent had been obtained from a representative of the rescue centre responsible for this dog. Following routine premedication and induction, a size 4 dog SGAD was placed into the pharynx. The device was connected to a Humphreys ADE circuit to supply oxygen and isoflurane. Multiparameter monitoring was used during the procedure.

The dog was positioned in dorsal recumbency on a surgical bean bag.

## RESULTS

As surgery commenced, a noise was audible from the neck region. Approximately 100ml of brown fluid exited the gastric channel. A gastric drain tube was inserted into the gastric channel of the v-gel, allowing removal of material and oesophageal flushing with sterile saline to remove remaining debris. Intra-airway endoscopy demonstrated that no regurgitate had entered the airway channel.

## STATEMENT (CONCLUSIONS)

This demonstrates that regurgitation can occur without warning during anaesthesia in the dog and that placing a drainage channel in the oesophagus can help to channel unexpected material away from the airway. An integrated drainage channel can also make placement of an oesophageal or gastric drainage tube easier.

# A case of recurrent obstructive fibrinous tracheal pseudomembrane in a dog

**Louise Dawson<sup>1</sup>, Kirsty Baird<sup>2</sup>**

<sup>1</sup> IDEXX Laboratories UK, Wetherby, United Kingdom

<sup>2</sup> Hird & Partners LLP, Halifax, United Kingdom

## OBJECTIVES

Recurrent obstructive fibrinous tracheal pseudomembranes are a rare complication of endotracheal intubation in humans. Only one case is reported in the veterinary literature to our knowledge. The clinical presentation and histopathological findings in another case is described in this case report.

## METHODS

Samples from the trachea of a 9 year-old border terrier were submitted to IDEXX Laboratories, Inc. for histopathological evaluation. The patient presented with respiratory difficulties following a previous general anaesthetic.

## RESULTS

Histopathology was consistent with aggregates of debris, fibrin and inflammatory cells, consistent with fibrinous tracheal pseudomembrane. The dog recovered uneventfully following removal of the intratracheal fibrinous material.

## STATEMENT (CONCLUSIONS)

Recurrent obstructive fibrinous tracheal pseudomembranes are a rare complication of endotracheal intubation and should be on the differential diagnosis list for dogs presenting with dyspnoea following a recent general anaesthetic.

## Poster presentations

### Use of tiletamine-zolazepam in common kestrels (*Falco tinnunculus*)

**Margarita Galka<sup>1</sup>, Jose Maria Aguilar<sup>2</sup>, Miguel Angel Quevedo<sup>2</sup>, Celia Sánchez<sup>3</sup>, Jose Maria Santisteban<sup>1</sup>, Rafael Gómez-Villamandos<sup>1</sup>**

1 Departamento de medicina y cirugía animal, Córdoba, Spain

2 Zoobotánico, Jerez de la Frontera, Spain

3 Consejo de Seguridad Nacional, Madrid, Spain

#### OBJECTIVES

Important work is carried out in wildlife rehabilitation centers all over the world, frequently with little funding. Light anaesthesia can be used to reduce stress caused by daily clinical routines of birds. Ketamine combinations are safe and are frequently used in these settings with good results. Due to the present threat of the banning of ketamine, new products need to be evaluated. We decided to use tiletamine instead of ketamine.

#### METHODS

We included a total of 15 common kestrels (*Falco tinnunculus*). Different doses of tiletamine/zolazepam were administered IM: 2 patients received 20 mg kg<sup>-1</sup>, 2 30 mg kg<sup>-1</sup>, 5 40 mg kg<sup>-1</sup> and 6 received 20 mg kg<sup>-1</sup> plus xylazine. HR, fR, cloacal temperature, muscle tone and response to pain were recorded every 5 minutes. Quality of induction, anaesthesia and recovery were also evaluated.

#### RESULTS

All patients responded well to induction and rapidly became recumbent. Patient handling was easy due to no struggling, although muscle relaxation was not good and 33,3% shivered. All patients maintained vital constants within normal limits, although cloacal temperature dropped drastically over time (5 minutes 41,0 ± 1,0°C, 30 minutes 38,7 ± 2,5°C). All patients recovered calmly.

#### STATEMENT (CONCLUSIONS)

Doses of 20 mg kg, 30 and 40 tiletamine/zolazepam, with or without xylazine in common kestrels (*Falco tinnunculus*), made patient handling easier, thus reducing stressful time during clinical routines, although it failed to provide good anaesthesia quality. Tiletamine/zolazepam combinations, although safe, should not be recommended for general anaesthesia of common kestrels (*Falco tinnunculus*), at these doses, but further studies would be interesting.

### Use of butorphanol in sevoflurane anaesthetized Greylag geese (*Anser anser*)

**Margarita Galka<sup>1</sup>, Miguel Angel Quevedo<sup>2</sup>, Jose Maria Aguilar<sup>2</sup>, Celia Sánchez<sup>3</sup>, Jose Maria Santisteban<sup>1</sup>, Rafael Gómez-Villamandos<sup>1</sup>**

1 Departamento de medicina y cirugía animal, Córdoba, Spain

2 Zoobotánico, Jerez de la Frontera, Spain

3 Consejo de Seguridad Nuclear, Madrid, Spain

#### OBJECTIVES

Pinioning is a method used to prevent flight of birds kept in captivity. Traditionally inhalatory agents are used for avian anaesthesia. Opioids are strong analgesic agents used widely in numerous species, although there are few studies in aquatic birds. We wanted a pain free protocol for pinioning.

#### METHODS

6 Greylag geese (*Anser anser*) were submitted to pinioning. 2 received only sevoflurane anaesthesia (SEVO group)

and 4 received 4mg kg<sup>-1</sup> butorphanol 20 minutes prior to gas induction (SEVO+BT group). Induction was carried out with 8% sevoflurane delivered via facemask attached to a semiopen circuit using Ayre's "T" piece. HR, fR, cloacal temperature, % sevoflurane, SpO<sub>2</sub> and PECO<sub>2</sub> were recorded every 5 minutes. Quality of induction, anaesthesia and recovery were also evaluated.

#### RESULTS

A swift and smooth induction was achieved in all cases. All patients presented an excellent degree of muscle relaxation maintaining all vital constants within normal limits. All SEVO cases, responded slightly to some of the painful surgical stimuli, while this occurred only in 50% of SEVO + BT group. Mean sevoflurane concentrations were 6,7 ± 1,5% (SEVO) and 7,0 ± 1,4% (SEVO + BT). Recovery was also excellent in all cases.

#### STATEMENT (CONCLUSIONS)

Sevoflurane anaesthesia, with and without butorphanol is a safe option for anaesthetizing Greylag geese (*Anser anser*) for pinioning, although can not be recommended due to lack of analgesia in some cases. Adding 4 mg kg<sup>-1</sup> 20 minutes prior to sevoflurane anaesthesia did not reduce % sevoflurane requirements and only improved analgesia quality in 50% of the patients. Further studies are needed, perhaps with higher doses of butorphanol.

# Presumed acute polyradiculoneuritis in two dogs associated with snake bite caused by a Montpellier snake (*Malpolon insignitus*)

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## OBJECTIVES

The aim of this presentation is to describe the clinical signs, treatment and outcome of two dogs with Montpellier snake (*Malpolon insignitus*) envenomation.

## METHODS

This is a report of two adult, male dogs presented at the ICU in lateral recumbency a day after a witnessed snake

bite. According to the owners, the snake population of the region, and the macroscopic appearance of the wound, the snake was identified as a Montpellier snake (*Malpolon insignitus*). Clinical examination of both dogs was unremarkable with the exception of an obvious puncture wound on their upper lips, but the neurologic examination revealed flaccid, non ambulatory tetraparesis with generalised hyporeflexia, normal functioning cranial nerves and hyperesthesia at the site of injury. Complete blood count and routine biochemical parameters were unremarkable for both dogs except from creatine kinase, which was measured in only one dog and was elevated. Electromyography findings were compatible with polyneuropathy, and a presumptive diagnosis of acute polyradiculoneuritis due to Montpellier snake venom was made.

## RESULTS

Both dogs were hospitalized in the ICU. Supportive care in order to provide adequate food intake, along with a combination of antibiotics (cephalosporins) and analgesics (tramadol and non steroid anti-inflammatory drugs) was provided. In both dogs there was a regression of neurological signs. They fully recovered and were discharged in a week.

## STATEMENT (CONCLUSIONS)

This is the first report of a presumptive acute polyradiculoneuritis due to Montpellier snake (*Malpolon insignitus*) bite in dogs.

# Propofol as a postoperative appetite stimulant (preliminary results)

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Small Animal Clinic, Aristotle University of Thessaloniki, Thessaloniki, Greece

## OBJECTIVES

The purpose of this study was to assess the appetite stimulant effects of the intravenous administration of propofol in dogs postoperatively.

## METHODS

In this cohort study, adult, female dogs, submitted for elective ovariohysterectomy (ASA status 1) were enrolled. All dogs received the same anaesthetic protocol (dexmedetomidine 180 µg/m<sup>2</sup> im, methadone 0.2 mg/kg im,

meloxicam 0.2 mg/kg sc for premedication, induction with propofol to effect and maintenance with isoflourane in O<sub>2</sub>). Inclusion criteria were: the dogs to be fully alert, with mild or no pain and stress. Dry food was offered 6 hours after surgery to all dogs. If any dog was anorectic, an intravenous bolus of propofol (2mg/kg) was administered. The amount of food consumed was recorded, as well as the time from the administration of propofol until the consumption of food. In the dogs that did not respond to the administration of propofol, the same procedure was repeated 12 hours later.

## RESULTS

Fifteen dogs were included in the study. All dogs were anorectic 6 hours postoperatively. Ten dogs started eating, after the first propofol administration, whereas five dogs started eating after the second bolus of propofol, 12 hours later. One dog remained anorectic. The dogs that responded to the propofol bolus consumed one fourth of their daily energy requirements, which was offered to them, on average 3.7 minutes after the propofol administration.

## STATEMENT (CONCLUSIONS)

Preliminary results of this study suggest a positive, short-term effect of propofol as an appetite stimulant in dogs, postoperatively.

## Poster presentations

### Spontaneous haemothorax in juvenile dogs: a case series

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3 Willows Veterinary Centre and Referral Service, Solihull, United Kingdom

#### OBJECTIVES

To describe the clinical features, treatment, and outcome of juvenile dogs presenting with spontaneous haemothorax.

#### METHODS

Multi-centre retrospective referral-based study. Hospital databases were searched for dogs aged 1–24 months with a diagnosis of spontaneous haemothorax. Dogs were defined as spontaneous haemothorax provided there was no history of trauma, evidence of a coagulopathy (platelet count < 50 x 10<sup>9</sup>/l, prolonged PT or APTT), or intrathoracic mass. Data extracted for analysis

included signalment, history, investigation findings, treatment, and outcome.

#### RESULTS

Seven dogs from two referral centres were identified. Median age was 11 months (range 3.5–20 months) with no obvious sex predisposition (3 FE, 1 FN, 2 ME, 1 MN), there were two Chihuahuas and two whippets, remaining breeds were represented once. Commonly reported clinical signs included lethargy (n = 7) and pyrexia (n = 6). Thymic pathology was suspected in six dogs based on thoracic imaging. Three dogs were managed surgically and four were managed conservatively. Medications administered included antimicrobials (n = 7), non-steroidal anti-inflammatories (n = 3), glucocorticoids (n = 1), one dog managed surgically received a blood transfusion. Histopathology of thymic tissue was available from the surgically managed dogs and compatible with thymic haemorrhage in all cases.

Two out of three dogs managed surgically died, recorded reasons were phrenic nerve dysfunction secondary to thoracotomy and acute lung injury following mechanical ventilation respectively. All four dogs managed conservatively survived with no recorded recurrence.

#### STATEMENT (CONCLUSIONS)

Spontaneous haemothorax can occur in young dogs. Pyrexia was a common feature although causality is not established. Outcome with conservative management appeared to be superior to surgery in this cohort of dogs.

### A survey investigating factors influencing a surgeon's choice of ovariohysterectomy Vs ovariectomy when neutering female dogs in UK small animal vet practices

Talya Beattie

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#### OBJECTIVES

Ovariohysterectomy (OVH) is the commonest procedure for routine neutering of bitches in the UK, with

ovariectomy (OVE) and laparoscopic techniques (LOVH and LOVE) becoming more popular. The aim of this research was to determine what factors influence techniques chosen by veterinary surgeons (VS) to neuter bitches and, in particular, if the most important factor influencing choice is undergraduate teaching.

#### METHODS

Prospective observational cross sectional study. An online survey, designed on Survey Monkey, was distributed to practice email addresses obtained from the 2018 Royal College of Veterinary Surgeons (RCVS) practice database. 3072 emails were delivered, generating 788 responses (24.3% response rate).

#### RESULTS

OVH was the most commonly taught technique at university (99.3%), followed by OVE. Mann Whitney U tests indicated that <5yrs graduates had been taught and observed a greater number of techniques than >5 year graduates (p < 0.0001, p < 0.0001).

The majority of VS learnt most in their first job (62.0%), did not learn a new technique post-graduation

(78.2%) and preferred OVH (83.0%). A Kruskal Wallis test indicated the most important factor influencing a surgeon's choice of bitch neutering technique was their own clinical experience and lack of training in other techniques ( $p < 0.0001$ ). Cost was the least important factor.

## STATEMENT (CONCLUSIONS)

The results of this survey show that despite OVH still being the most commonly used neutering technique in the UK, most surgeons have a desire to practice different techniques. Our data suggest that OVH may be the mainstay technique used in UK practices due to the lack of post-graduate training offered to employees.

# Identifying risk factors for cardiac murmurs in dogs and cats

**Becky Milner**

University of Liverpool, Liverpool, United Kingdom

## OBJECTIVES

To identify risk factors associated with the presence of a cardiac murmur in dogs and cats using data from the Small Animal Surveillance Network (SAVSNET).

## METHODS

A retrospective case-control study using text mining to screen over 4 million consultation notes from participating small animal practices across the UK. Using a regular expression and classification system, 1419 consultations where a murmur was recorded in the free text were randomly identified. These were compared to 20,000

control animals which did not have the word 'murmur' identified in their records. Both odds ratios (OR) and confidence intervals were calculated for species, breed, age, gender and neutering status for both species.

## RESULTS

Certain dog breeds were shown to have a higher risk of murmurs in this population, the top being the Cavalier King Charles Spaniel (OR 10.6). The results also showed males (dogs OR 1.07, cats 1.28) and neutered (dogs OR 1.18, cats OR 1.19) animals had a higher risk. Overall cats were more at risk than dogs (OR 1.57).

## STATEMENT (CONCLUSIONS)

The results show certain animals appear to be at a higher risk of developing a murmur. This is the first time that such data has been used to evaluate murmurs in a large population of animals. Murmurs are common and often the first sign of heart disease, so by identifying animals at risk of murmurs, the management of cardiac disease in animals could be improved.

This was a non-funded summer research project carried out by a student hoping to pursue a career in small animal cardiology.

# Impact on ear concentrations of the active ingredients following ear cleaning with a ceruminolytic cleaner in dogs receiving a unique otic gel (florfenicol, terbinafine, betamethasone acetate)

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## OBJECTIVES

To determine the impact of a ceruminolytic cleaner on ear canal depletion of active ingredients of a unique otic gel for dogs, after two doses, and beyond the labelled period of efficacy.

## METHODS

Twelve adult dogs (4 groups of 3 dogs) with clinically normal ears were enrolled in this randomized, unblinded depletion study.

On Day 0 (D0), before first treatment, both ears of all dogs were cleaned with saline and ear swabs taken from both ears.

All dogs were treated bilaterally with the otic gel on D0 and D7.



## Poster presentations

Bilateral ear swabs were collected from three dogs each as follows: D28 post-cleaning with ceruminolytic cleaner and additional ear swab on D30; D45 post-cleaning with ceruminolytic cleaner and additional ear swab on D47; D60 (no cleaning); and D80 (no cleaning).

### RESULTS

Concentrations of actives were substantially higher after cleaning on D28 compared to swabs collected 48 hours later (D30) with similar results from D45 to D47. This is due to actives measured from loosened cerumen immediately post-cleaning resulting in an increase of cerumen on swabs.

Cleaning on D28 or D45 enhanced the removal of active ingredients as demonstrated by lower concentrations compared to those measured on D60 without cleaning.

### STATEMENT (CONCLUSIONS)

Ear cleaning with a ceruminolytic removes active ingredients but may need repeating to further clean out loosened cerumen. Without cleaning, concentrations of actives remain measurable for at least 60 days after administration on D0 followed by a second administration on D7, with measurements at or below level of quantification by D80.

## Pylorogastric intussusception in a puppy with a congenital intrahepatic shunt

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### OBJECTIVES

To report the first case of intrahepatic portosystemic shunt and concurrent pylorogastric intussusception in a dog.

### METHODS

Case report of a single patient describing intrahepatic portosystemic shunt and concurrent pylorogastric intussusception in a dog.

### RESULTS

A 16-week-old female entire Akita-Inu puppy presented for investigation of abdominal distention, acute vomiting

and transient diarrhoea. After removal of transudate by abdominocentesis, abdominal ultrasound revealed a small and diffusely hyperechoic liver without visualisation of parenchymatous branching of portal vessels and abnormal tortuous course of the intrahepatic vessel connecting the portal vein and caudal vena cava in the right liver lobes. Additionally, pylorogastric intussusception was detected. The pylorus and proximal duodenum were displaced into the pyloric antrum and fundus. Multiple concentric echogenic and echolucent rings were visible on transverse section and colour Doppler ultrasonography revealed blood flow in vessels of the intussuscepted segment of stomach. Due to high surgical costs, medical management with amoxicillin clavulanic acid (12.5 mg/kg PO q12h), lactulose (5ml PO q8h), famotidine (0.5 mg/kg PO q24) and probiotics (1g PO q24) was elected. Three weeks later, abdominal ultrasound revealed a large amount of free anechogenic fluid in the abdomen and due to clinical deterioration, poor prognosis and financial concerns for coil embolisation, the puppy was euthanised.

### STATEMENT (CONCLUSIONS)

This is the first report in veterinary literature describing the occurrence of an intrahepatic portosystemic shunt and concurrent pylorogastric intussusception. Pylorogastric intussusceptions can resolve spontaneously, however, they can be life threatening and the diagnosis can be made based on abdominal ultrasonographic findings.



# Unusual bilateral retrobulbar abscess in the rabbit

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## OBJECTIVES

Retrobulbar abscesses are common problem in rabbits. Typically they have odontogenic origin. One of the most characteristic features of this disease entity is unilateral exophthalmos. Differential diagnosis includes: retrobulbar neoplasia, cellulitis, prolapse of retrobulbar fat, salivary mucocele, thymoma or other mass within thoracic cavity.

We present a case of exophthalmos in a pet rabbit suspected as bilateral abscess of the lacrimal gland.

## METHODS

Female pet rabbit was presented for dental consultation with bilateral asymmetrical exophthalmos and eye discharge. Previous treatment involved eyedrops (diclofenac, tobramycin), analgesia (tramadol) and antibiotics (penicillin and streptomycin). Dental examination and X-rays in various views were unremarkable (Fig. 1). Dual phase CT examination was performed (CereTom®, 8-slice portable scanner).

## RESULTS

CT examination showed bilateral abscess in the retrobulbar region with thinning of the alveolar bulla, more profoundly on the left side (Fig. 2). Due to deterioration of the clinical signs the surgery was performed via intraoral approach. Last 4 left maxillary cheek teeth, including alveolar bulla were extracted. No connection between abscess capsule and the bulla was noticed, but lots of pus and detritus was drained. The socket was left for healing by secondary intention. Due to persisting purulent discharge from the wound decision was made for subsequent surgeries – bilateral resection of the zygomatic arch with abscess capsule dissection (Fig. 3).

## STATEMENT (CONCLUSIONS)

Although no histopathological examination was performed most likely diagnosis was lacrimal gland abscess. CT is a great tool in describing pathologies of a dental and retrobulbar disease in rabbits.

# Free-floating fat in a furry! A mobile necrotic lipoma in the abdomen of a guinea pig

Chris Webb

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## OBJECTIVES

To report a mobile intra-abdominal necrotic lipoma in a male guinea pig.

## METHODS

An adult male neutered guinea pig (age approximately 3 years) was presented for routine health check after being adopted. Recent history was unremarkable though physical examination revealed an incidental non-painful, firm, highly mobile, bi-convex mass in the mid abdomen.

Repeat examination 2 months later revealed no palpable changes to the mass, though investigation was sought as he had become less interactive. Ultrasound

examination revealed an approximately 60mm x 40mm mass with heterogenous architecture and a thin hyperechoic rim.

A detached, ovoid, brown, irregular mass with a thin friable exterior was identified and removed via a midline laparotomy without the need for ligation.

## RESULTS

Histopathological examination revealed the mass was almost entirely composed of necrotic adipose tissue. Adipocytes were well differentiated and the necrotic outlines of the cells were retained. Multifocal areas of necrotic fibrous connective tissue and necrotic debris admixed with degenerate neutrophils were noted. Multi-focally, small to moderate amounts of mineralised material was present. The mass was surrounded by a thin rim of fibrous connective tissue and diagnosed as a necrotic lipoma.

## STATEMENT (CONCLUSIONS)

Several reports of intra-abdominal mobile encapsulated adipose tissue in cows have been described with comparisons being made to those found in the subcutis of extremities in humans.

To the authors knowledge this is the first case of a free-floating necrotic lipoma in the coelomic cavity of a guinea pig.

# Poster presentations

## Annual weigh variation in mature cats

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- 2 Institute of Infection and Global Health, Liverpool, United Kingdom
- 3 Royal Canin Research Centre, Aimargue, France

### OBJECTIVES

To determine the magnitude and seasonality of variations in bodyweight measurements from client-owned cats enrolled in a wellness programme.

### METHODS

Records were available from 31 mature cats ( $\geq 7$  years) attending the Royal Canin Healthy Ageing Clinic. Variation as a percentage of body weight at enrolment was calculated for each cat.

### RESULTS

Weight change was minimal.

	Median (% change in BW)	IQR
Six month	-0.4%	-2.7% to 4.4%
Twelve Month	-0.6%	-5.3% to 2.4%

Cats were then assigned to groups based upon the time of year they were enrolled (Q1 winter, 4; Q2 spring, 16; Q3 summer, 11).

	Six Month Median (% change in BW)	Twelve Month Median (% change in BW)
Winter	-1.45% (IQR -2.035 - -0.85%)	-1.55% (IQR -3.13 - -0.55)
Spring	0.18% (IQR -3.0 - 4.85)	1.5% (IQR 0.55 - 3.89)
Summer	-0.31% (IQR -3.1 - 4.58)	-4.8% (IQR -7.58 - 1.625)

There were no statistically significant differences found between these three groups at the 6-month time point. However, at the 12-month time point, cats enrolled in Q2 were significantly more likely ( $P = 0.020$ ) to have gained weight than cats that were enrolled in Q3.

### STATEMENT (CONCLUSIONS)

This preliminary work suggests a seasonal effect on the bodyweight of mature cats. However, these findings should be confirmed by assessing a larger group of cats over a longer period.

## How old is your cat?

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- 3 Royal Canin Research Centre, Aimargues, France

### OBJECTIVES

To explore the accuracy of veterinary age assessment in mature cats and the effect that health status may have on the visual appearance of age.

### METHODS

Data were collected from 135 mature cats (7–10 years) enrolled at the Feline Healthy Ageing Clinic at the University of Liverpool. At time of enrolment, owners completed a questionnaire which gathered information

on date of birth, whether this was an estimate or was known, details of where the owner had acquired the cat, and how old the cat was when acquired. At their initial appointment, each cat had a thorough physical examination, and routine clinicopathological assessments (haematology, serum biochemistry and urinalysis). The attending veterinary staff (KJE, NJD) also subjectively assessed whether the cat: looked 'younger than their reported age', was 'age-appropriate', or was 'older than their reported age'. Cats were also subjectively classified as being 'healthy', 'in fair health' or 'in poor health' based upon physical examination findings, details in their electronic patient records, and results of routine clinicopathological tests. For comparison, cats were grouped according to the accuracy of their age, summarised below.

### RESULTS

An accurate age was known for 73 cats (54%), a close estimation was known for 22 cats (16%), and age was not accurately known for 40 (30%) cats.

Cats with an inaccurate age were 5.9 times more likely to have poor health (95% CI 1.2 – 29.3). A cat that looked older than its purported age was 18.6 times more likely to have poor health (95% CI 3.9 – 88.0).

		Subjective age assessment and health status		
		Younger	Age appropriate	Older
<b>Accurate age</b> (DOB known or acquired as a kitten <12w)	73 (54%)	15 (0 in poor health)	53 (0 in poor health)	5 (1 in poor health)
<b>Close estimate</b> (DOB not known but acquired as a kitten <24 w)	22 (16 %)	3 (0 in poor health)	17 (1 in poor health)	2 (0 in poor health)
<b>Inaccurate &gt;12 years</b> (exact age not known, but acquired as adult)	40 (30%)	4 (0 in poor health)	27 (1 in poor health)	9 (4 in poor health)

## STATEMENT (CONCLUSIONS)

A significant proportion of middle-aged cat have a potentially inaccurate age. The observation that cats who appear

older than their purported age are at higher risk of being in poor health is clinically applicable. Such observation could be used to prompt veterinarians to perform further diagnostic investigations.

# Deslorelin implant as a treatment for temporary infertility in tomcats

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## OBJECTIVES

Biggest reasons for temporary infertility treatment in tomcats are undoubtedly unwanted urine marking, vocalization, behavioural changes and poor appetite. Deslorelin is synthetic gonadotropin-releasing hormone agonist used to induce temporary infertility. At the moment use in cats is off-label and there is only little research done on the subject.

## METHODS

Study was done as online survey to cat owners who have used the implant on their tomcats.

## RESULTS

In total 486 answers were given from 28 countries and 31 different breeds. 70.8% of cats had offspring before implant and 89.2% of the cats got offspring after implant. Average age at implantation was  $24.1 \pm 14.6$  months. In average the effect lasted  $14.8 \pm 6.0$  months. It significantly reduced ( $p < 0.0001$ ) urine marking, vocalization, aggressiveness, restlessness and weight loss. Smell of pee decreased in 87% and testicle size decreased in 91% of the cats. Weight gain was reported in 77.5% of the cats. The implant had no effect in 2.1% of the cats. 19.5% tried to mate females in heat even without any other signs of stud behaviour and 5.3% got offspring during the implant. In 17% of cats the effect of second implant lasted longer than first and in 27.4% the effect ended earlier. 93% of owners had positive overall experience of the implant.

## STATEMENT (CONCLUSIONS)

In conclusion, deslorelin implant is easy to use and can be used as a temporary infertility treatment in tomcats, but it is not 100% effective and tomcats with the implant should be kept separated from females they are not allowed to mate.

## Poster presentations

# Differences between the gut microbial composition of diarrheic and healthy dogs

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## OBJECTIVES

Imbalances in the microbial composition of the intestinal microbiome are associated to various gastrointestinal diseases like chronic inflammatory enteropathy (CED) or inflammatory bowel disease (IBD). Recent studies have identified eight bacterial groups that are altered in dogs with chronic or acute gastrointestinal signs in comparison to healthy individuals and may be used as biomarkers for dysbiosis. Aim of the study was to establish a method suitable for the routine diagnostic screening of the intestinal microbiota for dysbiotic changes in dogs.

## METHODS

DNA from fecal samples from dogs (n = 10) with acute diarrhea and healthy dogs (n = 10) as control group was extracted during veterinary routine diagnostics. Subsequently qPCR assays targeting 16S rRNA genes for eight different bacterial groups (*Faecalibacterium prausnitzii*, *Fusobacteria*, *Blautia*, *Turicibacter*, *Escherichia coli*, *Clostridium hiranonis*, *Streptococcus* and total bacteria) were performed and total copy numbers per g faeces calculated.

## RESULTS

The intestinal microbiota of dogs with acute diarrhea were different to the one of the healthy control group. Particularly *F. prausnitzii*, an anaerobic species that has been reported to have beneficial effects on the integrity of the intestinal mucosal barrier was decreased 5-fold. In contrast, proteolytic microorganisms that may induce intestinal tumorigenesis or have pro-inflammatory potential like *Fusobacteria* were increased up to 10-fold.

## STATEMENT (CONCLUSIONS)

This study supports the hypothesis that alterations of the intestinal microbiota correlate with acute enteropathies in dogs. Furthermore, we highlight the additional insights this type of analysis offers in the future for differential-diagnostic purposes.

# Suspected Choledochal Cyst in a DSH cat

**Konstantinos Fontas**

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## OBJECTIVES

To present an uncommon cystic disease of the biliary tract in a cat.

## METHODS

A 9-year old female neutered cat was presented with polyphagia, weight loss, urinating in the house and behaviour change. In the clinical examination, jaundice and a palpable mass in the cranial abdomen were found. Haematology and biochemistry showed increased liver enzymes, total bilirubin and leucocytosis. Abdominal radiology and ultrasonography confirmed a large cystic structure caudal to the liver. Also, ultrasound-guided needle aspiration was taken, revealing a highly proteinaceous fluid with mixed bacterial growth. After stabilization, exploratory laparotomy was performed, revealing a large, thick, fluid-filled structure within the cranial

abdomen. The gall bladder and the pancreas were oedematous. Examination within the cyst showed potential communications with the duodenum and the biliary tree. Therapeutically, subtotal resection of the cyst wall was performed and after closing the connections, the remaining cavity was omentalised. Histopathology samples revealed multi-loculated cystic structure, chronic cholangitis and lymphoplasmacytic pancreatitis. Postoperatively, ursodeoxycholic acid, antioxidants and antibiotics were administered.

## RESULTS

The cat had an unremarkable recovery and so far the prognosis appears to be favourable. However, close monitoring is indicated to prevent recurrent biliary obstruction and ongoing hepatic and pancreatic disease.

## STATEMENT (CONCLUSIONS)

A choledochal cyst is rare in the cat. In the current case, the cyst was possibly of congenital origin and gradual distension resulted in late onset clinical signs due to biliary obstruction and bacterial infection from the intestine. Furthermore, late onset cyst development can be associated with underlying intestinal, pancreatic or biliary pathology.

# Novel causes of Budd-Chiari-like syndrome in two dogs

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## OBJECTIVES

To outline the investigation of two unusual cases of Budd-Chiari-like syndrome.

## METHODS

N/A

## RESULTS

**Case 1:** A 6-year-old, male-neutered Brittany spaniel presented with a week's history of progressive ascites. Investigations revealed hypoalbuminaemia (20g/L) but

normal globulins (26g/L). Resting bile acids (5.6µmol/L), ammonia (6µmol/L) and the UP:C (0.12) were within normal limits. Abdominocentesis yielded a high protein transudate. CT-angiography revealed progressive narrowing of the caudal vena cava (CaVC) at the level of the diaphragm but no evidence of intra- or extra-mural compression. No improvement was seen following caval stenting or after administration of human serum albumin or dexamethasone. Post-mortem examination revealed hepatic cirrhosis and a spherical appearance to the cranial liver resulting in extra-mural compression of the CaVC and hepatic veins. This was deemed the primary cause of the recurrent ascites.

**Case 2:** A 10-year-old, male neutered Border terrier presented with a four-day history of recurrent ascites. Biochemistry revealed hypoalbuminaemia (21g/L) and mild hypoglobulinaemia (24g/L). Post-prandial bile acids were not suggestive of a portosystemic shunt (16.7µmol/L) and the UP:C (0.14) was within normal limits. Peritoneal fluid analysis was consistent with a high protein transudate. CT-angiography revealed focal stenosis of the CaVC caudal to the right atrium due to circumferential wall thickening. Post-mortem gross examination revealed mediastinal lymphadenomegaly, microscopically characterised by nodal histiocytic anthracosis, causing extra-mural compression of the CaVC. This abnormality was deemed the primary cause of the recurrent ascites.

## STATEMENT (CONCLUSIONS)

These cases represent two previously unreported causes of Budd-Chiari-like syndrome in dogs, both caused by extra-mural compression of the CaVC.

# Fanconi-Syndrome in a Labrador Retriever

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## OBJECTIVES

Fanconi syndrome is an inadequate reabsorption in the proximal renal tubules because of congenital or acquired causes, resulting in a selective or generalized aminoaciduria and the loss of electrolytes, glucose, lactate and bicarbonate with the urine. Left untreated, Fanconi syndrome leads to progressive kidney failure.

## METHODS

A male 11 year old Labrador Retriever was presented to the clinic with vomiting, lethargy, weakness, and polydipsia. Increased levels of urea and creatinine were found in

the blood, as well as a mild anemia. Urinalysis showed a severe aminoaciduria and glucosuria.

## RESULTS

The findings of the clinical examination together with blood work and urinalysis were consistent with Fanconi syndrome. In the following months, the general condition deteriorated, and serum concentrations of urea and creatinine increased. The dog was euthanized 17 months after the first presentation. Both kidneys showed a highly uneven surface of firm consistency and massive concretion deposits in the renal pelvis. Pathohistological examination revealed a bilateral severe chronic interstitial lymphoplasmacellular pyelonephritis with severe nephrolithiasis and cyst formation. The concretions found in the renal pelvis were beige and smooth and mostly composed of struvite together with calcium-rich apatite.

## STATEMENT (CONCLUSIONS)

For Labrador Retrievers, several cases of Fanconi syndrome have been reported in the literature, in some cases linked to a copper-mediated hepatitis. In the present case, no copper storage disease was detected, and there was no evidence of alimentary or drug related reasons. Further research is needed to identify possible congenital causes in the Labrador Retriever.

## Poster presentations

# Steroid responsive Meningitis Arteritis and concurrent Osteoma cutis in a dog

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## OBJECTIVES

Osteoma cutis refers to heterotopic ossification within the skin. Whilst veterinary reports are few, a number of cases suggest an association of osteoma cutis in dogs with chronic glucocorticoid therapy. Steroid Responsive Meningitis Arteritis (SRMA) is an immune mediated inflammatory disorder of the leptomeninges and associated arteries. It is typically seen in young dogs between 6 and 18 months. Patients commonly present with cervical pain and pyrexia. Prednisolone monotherapy is the mainstay of treatment.

We report a case of osteoma cutis in a dog with a concurrent relapse of SRMA. We also report the use of cytarabine as a successful treatment for the SRMA.

## METHODS

A one-year old female neutered Border Collie presented with cervical pain and pyrexia. Clinical examination also revealed multiple hard non-painful plaques beneath the skin between the shoulder blades and base of the tail. Wedge biopsies of the skin lesions and a cisternal CSF tap were taken for histopathology and cytology respectively.

## RESULTS

Cytology of CSF revealed a neutrophilic pleocytosis consistent with SRMA. Histopathology showed the presence of calcified bone within the subcutis.

Given the association within the literature of osteoma cutis and steroid use, the dog was started on intravenous cytarabine infusions. As they were not causing any morbidity, the osteoma cutis lesions were monitored.

After 6 months of follow up the dog is in remission and showing no ill effects from her skin lesions.

## STATEMENT (CONCLUSIONS)

To the best of our knowledge, we report the first case in the literature of cytarabine as an effective monotherapy for SRMA and only the fourth case in the literature of osteoma cutis.

# Prevalence of neurological disorders in Cavalier King Charles Spaniels in neurology referral populations

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## OBJECTIVES

This study aimed to determine the distribution of clinical presentations and the prevalence of neurological conditions in Cavalier King Charles Spaniels (CKCS). A

particular focus was placed upon establishing if syringomyelia was a prevalent disease in CKCS and a frequent diagnosis in referral populations.

## METHODS

Records of 500 CKCS presenting to Fitzpatrick Referrals and the Royal Veterinary College neurology departments over a selected four-year period (September 2013–September 2017) were searched. Data was examined to determine the presenting clinical signs and final diagnosis made and analysis was carried out to establish the prevalence and frequency of these.

## RESULTS

The most common clinical presentations of all neurological conditions were behavioural signs of pain (312 cases; 62.4%), spinal pain (238; 47.6%), phantom scratching (121; 24.2%) and gait abnormalities (90; 18.0%). The most common final diagnosis was syringomyelia (216 affected; 43.2% prevalence), orthopaedic conditions (74; 14.8%) and intervertebral disc disease (60; 12.0%). Other less frequently documented conditions included Chiari-like malformation associated pain (56; 11.2%), myoclonus (19; 3.8%), epilepsy (18; 3.6% and skin disease (12; 2.4%).

## STATEMENT (CONCLUSIONS)

This study provides vital information for veterinarians, breeders and owners of CKCS about common presentations of syringomyelia and other neurological diseases to allow for earlier recognition of these potentially painful

disorders. It concludes that syringomyelia is the most prevalent neurological disease in referral practices and emphasizes the frequency of pain associated with neurological disorders, but when compared to previous studies, it may be underdiagnosed in first opinion practices.

# Rostral skull changes in Cavalier King Charles spaniels with Chiari-like malformation and syringomyelia

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## OBJECTIVES

Chiari-like malformation (CM) and secondary syringomyelia (SM) have proven associations to multiple morphological traits of the caudal cranium and cervical spine in Cavalier King Charles Spaniels (CKCS). Since brachycephaly increases risk for disease, this study focused on the morphology of the rostral skull and forebrain and aimed to identify physical features associated to development of CM associated pain (CM-P) and SM with a more severe phenotype.

## METHODS

Analysis of 12 measurements (11 lines and 1 angle) taken on T2 weighted midsagittal MRI of the skull and cervical spinal cord of 66 CKCS enabled the comparison of 3 phenotypic groups: dogs without SM or CM-P (control group; n = 11), dogs with CM-P only (n = 15), dogs with clinically severe CM/SM (syrinx transverse diameter  $\geq 4$ mm and clinical signs relating to SM; n = 40).

## RESULTS

SM-affected CKCS had an increased height of the cranium ( $p = 0.028$ ) and reduced depth of the stop ( $p = 0.006$ ) compared to controls. SM-affected CKCS also had a significant reduction in height of the nasal cavity compared to CM-P ( $p = 0.014$ ). There were 2 additional significant traits comparing dogs with and without SM; SM affected dogs had a more ventral orientation of the olfactory bulbs ( $p = 0.014$ ) and shorter distance between basicranium and hard palate ( $p = 0.031$ ).

## STATEMENT (CONCLUSIONS)

Dogs with symptomatic CM/SM are more likely to have brachycephalic features of the rostral skull with "midface" hypoplasia similar to craniosynostosis Crouzan syndrome. This not only enhances our understanding of the disease and "at risk" head conformation but could also impact assessment of MRI and disease diagnosis.

# Unusual clinical presentation of dystrophin-deficient feline muscular dystrophy in the UK

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## OBJECTIVES

Dystrophin-deficient feline muscular dystrophy is a rare myopathy caused by absence of dystrophin, a large protein found in cardiac and skeletal muscles. The majority

of previously reported cases have presented with generalised muscle hypertrophy and overt gait abnormalities.

## METHODS

An eight month old male neutered domestic short hair was referred for further investigation of a four day history of regurgitation and tongue lesions. Multiple non-painful raised white plaques were visualised on the tongue. Mild pelvic limb stiffness and plantigradism was detected. Cranial nerves were assessed to be normal.

## RESULTS

Moderately increased ALT, AST and markedly raised Creatine Kinase were documented. Thoracic radiographs revealed severe oesophageal dilation, cardiomegaly, scalloped diaphragm and sternal malformation. Tongue lesion histology revealed calcinosis circumscripta. These features raised the suspicion of feline muscular dystrophy.



## Poster presentations

Further investigations were declined given the poor prognosis and the patient was humanely euthanised.

Post-mortem histopathology exhibited severe myofiber diameter variability with degenerative changes and prominent calcific deposits in the tongue and diaphragm. Similar findings were detected in multiple skeletal muscles.

Generally, fresh or frozen samples are needed for immunohistochemical investigations. An alternative immunohistochemistry technique (HRP method) using anti-DYS1, DYS2, DYS3,  $\alpha$ -sarcoglycan and  $\gamma$ -sarcoglycan

antibodies in formalin-fixed samples was performed. The negativity for dystrophin confirmed the diagnosis of feline muscular dystrophy.

### STATEMENT (CONCLUSIONS)

An unusual clinical presentation of feline muscular dystrophy is described. This condition should be considered in cats presenting with regurgitation and tongue lesions. The HRP method can be used in formalin-fixed muscle samples to confirm the diagnosis.

## Comparison of outcome of dogs with thoracolumbar spinal injuries based on treatment and severity of neurologic status

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<sup>3</sup> Department of Statistics, Athens University of Economics and Business, Athens, Greece

### OBJECTIVES

To retrospectively compare the outcome of dogs with fractures/luxations of the thoracolumbar spine based on neurologic status and treatment method.

### METHODS

In our study period, 53 dogs with injury of the thoracolumbar spine and a recorded outcome were enrolled.

Neurologic status was classified in a 5-grade scale; an additional grade ("grey zone") introduced between paraplegic cases with (grade 4) and without (grade 5) nociception and included subjects with reduced, but not absent, deep pain perception. The statistical models used for the purposes of this study aimed to reveal useful insights about the variables that affect final clinical outcome the most. Additionally, the distribution of incidents between each possible level of neurologic grade, final clinical outcome and treatment were examined and tested independently. The R software was used for the statistical analysis and a value of  $p < 0.05$  was considered significant.

### RESULTS

The neurologic status was the only statistically significant variable affecting outcome. No other variable or comparison revealed a statistically significant result. Furthermore, the newly introduced grey-zone showed to have a trend towards the less severe cases (grade 1 to 4) regarding treatment, whereas a trend towards the most severe cases (grade 5) was shown regarding outcome.

### STATEMENT (CONCLUSIONS)

The severity of neurological status affects the outcome. Cases classified in the grey zone had similar outcome to the severe cases (grade 5), despite being treated in a pattern similar to the milder cases (grades 1 to 4). Concluding, in severe thoracolumbar syndrome the reduced but not absent deep pain perception did not significantly improve outcome of affected dogs.



# Delayed forebrain syndrome due to traumatic intranasal meningoencephalocele in a cat

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## OBJECTIVES

Meningoencephalocele is a protrusion of meninges and brain through an opening in the cranium; in humans it may be congenital, traumatic, neoplastic or idiopathic, whilst in small animals mostly congenital form has been reported.

## METHODS

A 3-year-old, client-owned, neutered male DSH cat was referred with one-month history of three generalized tonic-clonic seizures and intermittent left thoracic limb

spontaneous knuckling. Nine months ago, the animal had been bitten on the head by a wild carnivore. Prior to the traumatic event the cat was reported to be neurologically normal.

## RESULTS

On admission, physical examination was unremarkable. Neurological examination revealed left hemi-neglect syndrome, characterised by decreased postural reactions on the left thoracic and pelvic limb, and absent menace bilaterally, most likely post-ictal. Neuroanatomical localisation was right forebrain. Haematology, biochemistry and bile acid stimulation test were unremarkable. Blood serology for *Toxoplasma gondii*, FIV, FeLV and FCoV were all negative. MRI of the head revealed protrusion of brain and meninges into the right frontal sinus, mild meningeal contrast uptake of the protruding tissue and the adjacent brain in the calvarium. CSF analysis was unremarkable. Final diagnosis was traumatic intranasal (frontoethmoidal) meningoencephalocele with late-onset forebrain syndrome due to presumptive post-traumatic encephalomalacia. The cat remained seizure-free on the four-month follow-up.

## STATEMENT (CONCLUSIONS)

This is the first report of traumatic meningoencephalocele in cats. The finding in this case emphasizes the importance of a complete neurological investigation in patients with history of head trauma despite the absence of initial neurological signs. Differentials for delayed neurological signs after traumatic meningoencephalocele include encephalomalacia, recurrent meningitis with/without CSF rhinorrhea or cerebral ischaemic infarction.

# Key factors that influence an owner's decision to feed their dog a senior diet

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## OBJECTIVES

To determine what influences an owner's decision to feed a senior diet. Few senior dogs in the UK are fed age-appropriate diets despite evidence that these dogs have reduced maintenance energy requirements, increased protein requirements and a reduced basal metabolic rate and that diet can be used to manage or treat age-related disease.

## METHODS

A mixed methods questionnaire was distributed to dog owners via seven UK dog Facebook groups. Dogs age

seven and over were classed as senior. Data analysis was carried out in Microsoft Excel.

## RESULTS

59% (n = 214) of dogs in the study were classed as senior. Despite 27% of owners worrying about their dog's ageing and 84% recognising that diseases such as obesity and diabetes can be supported by diet, only 25% of senior dogs were fed senior diets. Factors influencing this decision were if the dog was fed a commercial diet, if the owner was worried about their dog's ageing, recognition that their dog's nutritional requirements change, the provision of joint support within the diet, specific ingredients in the food and if the diet was 'good quality'. 64% of owners thought glucosamine should be added to senior dog diets and 60% had spoken to their vet about nutrition of their dog.

## STATEMENT (CONCLUSIONS)

Many owners speak to their vet about their dog's diet, but few feed an age-appropriate diet. This highlights a missed opportunity for veterinarians to be more proactive in discussing diet with clients and to use diet in the treatment and prevention of disease.

## Poster presentations

# The use of toceranib phosphate after surgical resection of haemangiosarcoma from the aortic arch in a German Shepherd dog

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## OBJECTIVES

To report the post-operative outcome and survival of a dog after surgical resection of a haemangiosarcoma from the aortic arch using toceranib phosphate as an adjunctive therapy.

## METHODS

Case report of a single patient treated with metronomic chemotherapy instead of conventional high-dose

chemotherapy for adjuvant therapy of hemangiosarcoma of the aortic wall.

## RESULTS

A 7-year-old male German Shepherd dog presented for investigation of lethargy. Pleural, peritoneal and pericardial effusion were identified, and echocardiography was indicative of a heart-based mass. The mass was surgically excised from the aortic arch and a subtotal pericardiectomy performed. Histology confirmed the mass was an incompletely excised haemangiosarcoma. The patient was started on epirubicin protocol (25mg/m<sup>2</sup>) but developed a severe septic neutropenia and thrombocytopenia. This recurred following the second treatment of epirubicin despite a dose reduction of 10%. Consequently, the patient was started on metronomic chemotherapy with toceranib phosphate (80mg orally Monday, Wednesday and Friday weekly). Eight months following the diagnosis the patient remains systemically well on metronomic chemotherapy with an excellent quality of life. Repeat staging has been negative for local and distant metastases but shows tissue thickening at the level of the aortic arch.

## STATEMENT (CONCLUSIONS)

Metronomic chemotherapy has been proposed for adjuvant therapy in dogs that do not tolerate conventional anthracycline based chemotherapy protocols. This is the first reported case of the use of a tyrosine kinase inhibitor as an adjuvant therapy for cardiac haemangiosarcoma.

# Hemipelvectomy in a rabbit: surgical technique and outcome

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## OBJECTIVES

To describe the clinical presentation, surgical technique and postoperative outcome of a rabbit after a right-sided hemipelvectomy to treat a proximal femoral sarcoma.

## METHODS

A seven-year-old female rabbit was presented with a six-month history of chronic right pelvic limb lameness. Radiographs revealed a lytic coxofemoral lesion and computerized tomography detailed an expansile lesion within the proximal femur, with an appearance consistent with a soft tissue mass. Incisional biopsies revealed a

poorly differentiated sarcoma. A right-sided hemipelvectomy was performed. The pubis was cut paramedian at the cranial and caudal edges of the right obturator foramen and the sacroiliac joint was disarticulated. The resultant defect in the pelvic diaphragm was repaired by opposing the thoracolumbar fascia with external abdominal oblique and rectus abdominus with polydioxanone. Histopathology confirmed the biopsy findings, with tumor free margins achieved.

## RESULTS

The patient recovered well from surgery and had good mobility. The patient survived 21 months post-surgery and died of non-cancer related disease.

## STATEMENT (CONCLUSIONS)

To the authors' knowledge this is the first report of a hemipelvectomy performed in a rabbit. We describe the anatomical dissection in a cadaver to aid future surgeries. Hemipelvectomy is a surgery that is more routinely performed in canine and feline patients, but with the right candidate and owner commitment to aftercare, it can safely and successfully be performed in rabbits.

# Oral histiocytic sarcoma in a cat

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## OBJECTIVES

Feline histiocytic disease is poorly reported in the veterinary literature. Here we describe a tumour of the feline soft palate most consistent with histiocytic sarcoma. To the author's knowledge this is the first report of a feline histiocytic sarcoma of the oral cavity.

## METHODS

A 15 year-old male neutered domestic shorthair cat presented with a mass on the caudal soft palate. An incisional biopsy was performed and sarcoma was highly suspected. Computed tomography (CT) of the patient's head and thorax identified a discrete, left-sided, soft tissue mass lesion cranial to the tonsil. Surgical removal

achieved cytoreduction. Adjuvant lomustine chemotherapy was initiated but was discontinued after one treatment cycle due to pancreatitis.

## RESULTS

Histopathology of the mass showed proliferation of large, polygonal to occasionally spindled neoplastic cells forming solid sheets and poorly defined streams. There was marked anisocytosis, anisokaryosis and frequent multinucleated giant cells. Periodic acid–Schiff and Ziehl–Neelsen stains were negative. Immunohistochemistry showed strong membranous HLA-DR positivity along with membranous CD18 immunopositivity within tumour macrophages. There was weaker CD18 and IBA1 staining of neoplastic cells. Immunohistochemistry for Melan A, PNL2 and CD117 was negative. The patient was diagnosed with suspected local recurrence 3 months post-operatively and was euthanised 6 months after initial diagnosis due to disease progression.

## STATEMENT (CONCLUSIONS)

Histiocytic sarcoma should be considered as a differential diagnosis in feline patients with an oral mass, especially if histopathology suggests a pleomorphic and poorly differentiated sarcoma. Immunohistochemistry for the confirmation of cell line origin would be strongly recommended.

# Unusual presentation of a bone metastasis in canine prostatic carcinoma

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## OBJECTIVES

The objective of this case report is to describe the radiological appearance of an elbow metastasis from a prostatic carcinoma.

## METHODS

An eight year old male neutered Chesapeake Bay Retriever presented with a few day history of dysuria and tenesmus. The dog was diagnosed with prostatic adenocarcinoma with urinary bladder involvement and regional lymph node metastases. The dog developed mild lameness on left fore limb one month after initial presentation which progressed over two weeks to non-weight bearing

despite pain relief and anti-inflammatory medication. Significant left elbow thickening was present. The computed tomography (CT), arthrocentesis and FNA of macroscopically abnormal tissue was performed.

## RESULTS

CT revealed a polyostic aggressive lesion, characterised by irregular periosteal proliferation, affecting the proximal ulna and radius, and humeral condyles. Mild cortical thinning and lysis at the anconeal and lateral coronoid processes was present. The primary differential for these changes was an inflammatory, degenerative and/or infectious process. Neoplasia was considered less likely due to the distribution of the lesions. Cell morphology of a changed bone was consistent with metastatic carcinoma. There were rare atypical cells within the joint fluid which also raised concern for a neoplastic process associated with the joint. Histopathological evaluation of the left elbow confirmed metastatic carcinoma with periosteal new bone formation, cartilage erosion and subchondral fibrosis.

## STATEMENT (CONCLUSIONS)

This case demonstrates that metastatic carcinoma can radiologically appear as an inflammatory/infectious process and involve multiple bones including joint. Cytological or histological confirmation of similar changes in carcinoma patients is advised.

## Poster presentations

# Peritoneal lymphomatosis in a cat

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## OBJECTIVES

The aim of this case report is to describe features of peritoneal lymphomatosis, a rarely described form of intra-peritoneal spread of lymphoma, in a 11-year-old female spayed domestic shorthair cat presented for pleural and abdominal effusions with a recent history of a hepatic icterus resolved with a short course of corticosteroids and antibiotics.

## METHODS

Physical examination, diagnostic imaging, clinical and histopathological analysis were performed.

## RESULTS

Physical examination revealed a poor body condition, restrictive dyspnea and abdominal distension with a fluid

thrill. Hematology, biochemistry, coagulation times, FIV/FeLV Elisa test were unremarkable. Analyses of the effusions were consistent with exsudates (specific gravity 1.030, proteins 40 g/L, presence of mature lymphocytes, no infectious agents on cytology, negative *Coronavirus* polymerase chain reaction, chylothorax excluded). Abdominal ultrasound showed a hepatomegaly, multiple small hypoechoic nodules localized to the peritoneum and diffuse steatitis. CT scan revealed bicavitary effusion associated with post-contrast enhancement of an irregular peritoneum consistent with disseminated small nodules, sternal and mesenteric lymphadenopathy. Exploratory laparotomy confirmed the diffuse infiltration of the peritoneum by small nodules, a rounded firm left pancreatic lobe, and severe mesenteric adenomegaly. Manual inspection of the gastro-intestinal tract did not reveal any abnormality. Histopathological analysis of the liver, peritoneum and mesenteric lymph nodes, and cytological analysis of the pancreas were diagnostic of a small cell lymphoma. Immunohistochemistry was consistent with an initial low-grade T cell-lymphoma transformed into a high-grade type within the liver. The cat was treated with prednisolone as owners denied chemotherapy.

## STATEMENT (CONCLUSIONS)

This case describes features of peritoneal lymphomatosis, a rarely described form of lymphoma dissemination, reported for the first time of low-grade T-cell origin.

# Computed tomography densitometry of eyes: a method to assess feline ocular diseases

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## OBJECTIVES

The objective of this study was to clinically apply Computed Tomography (CT) to determine the density of aqueous humor, lens, and vitreous in normal feline eyes.

## METHODS

Sixteen domestic short hair (DSH) cats including 10 males and 6 females were selected based on their normal

physical and ophthalmological examinations. CT of skull was performed in the sternal recumbency in all animals under the general anesthesia. CT scans were reconstructed at 1 mm and the density of the ocular structures was calculated by software Syngo 5.5, which regions of interest (ROI) about 0.04 cm<sup>2</sup>, 0.1 cm<sup>2</sup>, and 0.2 cm<sup>2</sup> were chosen in the anterior chamber, lens, and vitreous, respectively in the parasagittal and dorsal planes.

## RESULTS

The mean  $\pm$  SD aqueous humour, lens, and vitreous density were  $21.36 \pm 6.42$  HU,  $158.18 \pm 10.23$  HU, and  $17.34 \pm 4.49$  HU, respectively in parasagittal plane, and  $21.48 \pm 8.39$  HU,  $153.7 \pm 9.73$  HU and  $16.88 \pm 6.05$  HU, respectively in dorsal plane. No statistically significant differences were found in the density of both planes (P-value > 0.31). Besides, there was no statistically significant correlation between the density and weight (P-value > 0.062), as well as the density and sex (P-value > 0.26), in both planes.

## STATEMENT (CONCLUSIONS)

Considering the widespread use of CT for assessing ocular structures, it may be beneficial for veterinary radiologists and ophthalmologists to have baseline value of ocular densities in CT beforehand in order to evaluate and diagnose ocular abnormalities in cats accurately.

# Isolated traumatic radial head dislocation in a feline

**Jane Oatley**

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## OBJECTIVES

To describe a novel method for surgical stabilisation of the radial head dislocation while maintaining the gliding, rotational movement between the radius and ulna essential to normal locomotion in the cat. Aim to describe methods for overcoming the difficulties of rehabilitation in cats.

## METHODS

A craniolateral approach was made to the radial head at a traumatic puncture wound. A small bone fragment could be seen in this region in the radiographs. Monofilament

nylon suture was used as a synthetic annular ligament tunnelled beneath the cranial musculature over the cranial aspect of the proximal radius and passed caudally through a bone tunnel drilled in the ulna. The suture was secured with a knot laterally between the muscle bellies. No support dressings were applied and the cat was confined to room rest for 3 weeks.

## RESULTS

The cat walked on a stiff antebrachium, absent rotation in the swing phase by 10 days post surgery. After 3 weeks, she progressed to walking around the whole house and allowed on and off furniture. 5 weeks post surgery 3/10 lameness but good range of movement at the walk gait. From 6 weeks free exercise, encouraged to play with toys and start complex paw movements Sound 9 weeks post surgery (see videos).

## STATEMENT (CONCLUSIONS)

Annular ligament disruption is rare in cats. The range of supination and pronation in the cat is much larger than the canine and attention to preserving this function is essential for a good functional outcome.

# A biomechanical study comparing the use of the LokRod™ plate to plate and screw fixation for ex vivo stabilisation of femoral and tibial fractures in cats

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University of Bristol, Bristol, United Kingdom

## OBJECTIVES

To compare the biomechanical performances of the LokRod™ Plate and a Standard Locking Plate when applied to ex vivo osteotomised gap model feline tibiae and femora.

## METHODS

15 feline tibiae and 15 feline femora were tested separately and randomly assigned a LokRod™ Plate or

Standard Locking Plate, creating 4 groups. Tibiae were plated with 14 hole 101mm Standard Locking Plates, femora with 13 hole 94mm Standard Locking Plates. Both bone types were plated with 90mm LokRod™ Plates. Plates were applied using 4x 2.4mm locking screws. 1cm mid-diaphyseal osteotomies were performed after implant placement. Constructs underwent 3 series of 6000 loading cycles, then a further 45000 cycles, at 60% of mean bodyweight. Stiffness was measured at the start and end of each cycles series. Axial displacement was measured throughout. Constructs were loaded to failure at 5mm/min with failure modality digitally recorded. Ultimate load and displacement were also recorded.

## RESULTS

No constructs failed pre failure testing. Femoral constructs displayed no significant differences. Tibial LokRod™ Plate constructs showed significantly lower stiffnesses after 12000 cycles ( $p = 0.04$ ) and 18000 cycles ( $p = 0.018$ ). Tibial LokRod™ Plate constructs yielded higher loads before failure ( $678.66 \pm 83.58$  N) ( $p = 0.000$ ). The main construct failure modality was implant bending.

## STATEMENT (CONCLUSIONS)

By yielding reduced stiffness during cyclical loading and increased load before failure, the LokRod™ Plate may result in more reliable plate and screw fixation for feline patients, particularly where post-operative exercise restriction is more difficult. Clinical study validation is required.

## Poster presentations

### Safety profile of methylprednisolone acetate epidural injection in dogs treated for lumbosacral disease

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#### OBJECTIVES

To report side-effects after methylprednisolone acetate epidural injection in dogs treated for lumbosacral degenerative stenosis. Side-effects caused by inadvertent systemic administration of methylprednisolone acetate during epidural treatment has been reported in humans to range from 9 to 32.8%, however data in the canine population is limited (n = 15 to n = 38) and highly variable (0 to 50%).

#### METHODS

Computer records at a single referral institution in the UK were searched for dogs with MRI confirmed

lumbosacral degenerative stenosis who were treated with at least three methylprednisolone acetate epidural injections between April 2012–May 2018. Details on side-effects reported by owners at re-check examination approximately two weeks after treatment were analysed.

#### RESULTS

A total of 730 methylprednisolone epidural injections were analysed within a population of 150 dogs. After excluding cases without full follow-up information (n = 249), this resulted in a total of 481 cases. The following temporary side-effects were reported: 4.9% (n = 24) systemic side-effects including polyuria, polydipsia and/or polyphagia; 2.1% (n = 10) clinical deterioration or subdued temperament, 0.8% (n = 4) urinary incontinence and 0.8% (n = 4) diarrhoea. All side-effects resolved within a few days after treatment without intervention. No major or permanent side-effects were reported.

#### STATEMENT (CONCLUSIONS)

Epidural methylprednisolone acetate injection is a relatively safe medical treatment option for lumbosacral degenerative stenosis in dogs. Our retrospective analysis revealed an incidence of 8.6% transient side-effects that resolved without further intervention. This is comparable to human literature. No major catastrophic side-effects were noted.

### A case management Framework for complex decisions in a shelter setting

**Runa Hanaghan**

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#### OBJECTIVES

To provide a clear management framework for complex cases between veterinary professionals and other experts within a shelter environment. To aid collaboration and communication between multiple stakeholders.

#### METHODS

A simple framework established through an iterative process assists in case decisions. This allows for a careful balance between progressions within veterinary science and ethical assessments, inclusive of situational factors.

A complex case may arise when a dog has more than one problem to tackle or where there may be a lack of accessible resources for their ongoing care. Animal welfare and logical clinical decision making provides the basis of the Complex Case Management (CCM) framework to evaluate individual cases across multiple interdisciplinary teams arriving at a solution.

#### RESULTS

The CCM Diagram (*Figure 1*) provides broad topics (problem list, solutions, ability for the dog to cope and resources available) within the CCM Framework (*Figure 2*) comparable against expert opinions (behavioural





or veterinary problem elements) leading to a clear approach for multifactorial decision making.

Time-frame for treatment or recovery as well as the impact that each solution may provide must be included. Success of a solution may crucially rely on specific resources being available (personnel, pain medication or vet skills).

## STATEMENT (CONCLUSIONS)

Using this approach, pragmatic and welfare focused decisions can be made for individual animals where both circumstance and resource may be influential. Providing clarity in a decision process can reducing the stress and easing the burden for all parties when a sensitive decision may be required.

# Surgical management and outcome in a male puppy with urethrorectal fistula associated with type 1 atresia ani

**Phil Franklin , Anna Cronin, Jane Ladlow,  
Laura Owen**

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Cambridge, United Kingdom

## OBJECTIVES

To describe the first reported case of a male puppy with congenital urethrorectal fistula and type 1 atresia ani.

## METHODS

Congenital urethrorectal fistulae have been associated with anorectal malformations in the human, equine and feline literature, with atresia ani being reported most frequently. In contrast, such an association has not been

reported in the canine literature. The clinical presentation, diagnostic findings, surgical management and outcome are described for a puppy diagnosed with a congenital urethrorectal fistula and type 1 atresia ani.

## RESULTS

A four-month-old German short-haired pointer was presented for investigation of tenesmus and production of urine and faeces from a common perineal opening. A positive contrast retrograde urethro-cystogram identified a urethrorectal fistula, an abnormal distal trajectory to the caudal rectum and stenosis of the penile urethra. Abdominal ultrasound, haematology and biochemistry were unremarkable. Urine culture identified a heavy mixed bacterial growth. A 3.5F urinary catheter was placed retrograde into the fistula to aid identification and the fistula was ligated and transected via a perineal approach. The atresia ani was addressed by surgical anoplasty and a scrotal urethrostomy was performed to bypass the urethral stenosis. Postoperatively, resolution of the tenesmus and long-term satisfactory urination through the urethrostomy site was achieved.

## STATEMENT (CONCLUSIONS)

Surgical management of a urethrorectal fistula and associated atresia ani in this dog was successful, with resolution of clinical abnormalities. Surgical correction should be considered as a potential treatment option in similar cases.

## Poster presentations

### Wild boar injuries in hunting dogs: A retrospective study (2012–2016)

**Panagiotis Kokkinos<sup>1</sup>, Demetris Tselekis<sup>2</sup>, Georgios Kazakos<sup>3</sup>, Lysimachos Papazoglou<sup>3</sup>, Ioannis Tsokatarides<sup>4</sup>**

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- 2 Private Practice, Sparti, Greece
- 3 Companion Animal Clinic, School of Veterinary Medicine, Aristotle University of Thessaloniki, Thessaloniki, Greece
- 4 Private Practice, Drama, Greece

#### OBJECTIVES

Description of signalment, wound characteristics, treatment and outcome of wild boar injuries in hunting dogs.

#### METHODS

In this retrospective study, medical records of hunting dogs from a first opinion and a referral setting were

reviewed for wild boar injuries. Data for 117 dogs were collected and included signalment, physical examination findings, wound characteristics, season of injury, boar sex, type of treatment and outcome among others.

#### RESULTS

The majority of both the injured dogs (82%) and the boars (85%) were males. Over three quarters of dogs (77%) had a prior history of wild boar injury. The incidents occurred more frequently in December (30%). The most common site of injury was the abdomen (43.6%), followed by the hindlimbs (31.6%) and the thorax (21.4%), whereas 44% suffered multiple injuries. Wound exploration was indicated in 64% of abdominal and 72% of thoracic injuries. Pneumothorax and shock were seen in 20% and 22.4% of dogs, respectively. Surgical treatment was undertaken in 95.6% of the cases. The mean hospitalization time was 4.65 days. The outcome in 95.6% of the cases was good; moreover, 99% of the dogs returned to hunting activity in 26.3 days on average.

#### STATEMENT (CONCLUSIONS)

The confliction of hunting dogs with wild boars resulted in severe and extended injuries in dogs, usually requiring surgical intervention. Nevertheless, most of the dogs had a good outcome and returned to hunting activity after recovery period. To the authors' knowledge this is the first descriptive study about wild boar injuries in hunting dogs.

### Results of artificial urethral sphincter placement in female dogs with refractory urinary incontinence

**Joep Timmermans<sup>1</sup>, Bart Van Goethem<sup>1</sup>, Bouvien Brocks<sup>2</sup>, Hilde De Rooster<sup>1</sup>**

- 1 Ghent University, Merelbeke, Belgium
- 2 Anicura Dierenkliniek Eersel, Eersel, Netherlands

#### OBJECTIVES

To determine if placement of an artificial urethral sphincter provides continence in female dogs with refractory urinary incontinence.

#### METHODS

A retrospective analysis of multi-institutional patient databases resulted in 15 female dogs with refractory urinary incontinence without concurrent underlying disease, treated between September 2010 and March 2018. A hydraulic artificial urethral sphincter with subcutaneous

access port was placed according to the manufacturer's instructions. Treatment success was evaluated using a continence scoring system (scale 1 to 10, complete incontinence to complete continence, respectively) through telephone enquiry.

#### RESULTS

Median continence score preoperatively was 2/10 (range, 1 to 5). Median follow-up was 6 months (range, 3 months to 5.8 years). Postoperative percutaneous cuff inflation was performed in 7/15 dogs (47%). Complete continence was achieved in 8/15 dogs (53%), improvement in 4/15 dogs (27%), no effect in 2/15 dogs (13%), and worsening in 1/15 dogs (7%). In the patients that improved but were not cured postoperatively, additional medical therapy resulted in a postoperative continence score of 3/10 in 2/5 dogs. Major complications necessitating implant removal surgery occurred in 3/15 dogs (20%), minor complications occurred in 10/15 dogs (67%). Continence scores were awarded to 10/15 dogs (67%). Median continence score postoperatively at follow-up was 9.5/10 (range, 9 to 10).

#### STATEMENT (CONCLUSIONS)

The artificial urethral sphincter provides promising results in the treatment of bitches with refractory incontinence. In dogs that improve but are not cured after artificial urethral sphincter placement, supplementary medical therapy can further improve the continence rate.



# Simultaneous Incidence of Diaphragmatic Hernia and Intestinal Perforation in a Cat

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THIS ABSTRACT HAS BEEN WITHDRAWN  
BY THE AUTHOR

## Accidental fentanyl exposure in pets

Fiona Finlay<sup>1</sup>, James Dunne<sup>2</sup>

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2 Wiltshire CCG, Devizes, United Kingdom

### OBJECTIVES

Fentanyl is a highly potent opioid - accidental transdermal exposure resulting in fatalities has been reported in pets and children. Discussion of the topic prompted us to review the literature

### METHODS

Literature review

### RESULTS

- Many human patients are prescribed fentanyl – a 25 microgram/hour fentanyl patch is equivalent to an oral morphine dose of 60–90mg in 24 hours
- Discarded patches may still contain 50% of original drug – enough to cause serious harm/death

- Used patches should be disposed of carefully and not be put in a wastepaper bin where pets may find and ingest them - there is more than a 30-fold increase in absorption from the buccal mucosa if chewed compared with the transdermal route
- Swallowing an intact patch results in less rapid drug release compared with chewing, but systemic absorption is still significant
- Patches may also accidentally stick to an animal's skin
- Discarded patches should be folded putting the sticky sides of each patch together so that it sticks to itself. They should then be wrapped in paper or plastic before disposal
- Patients should check regularly that patch has not fallen off. May cover it with adhesive film to ensure it stays on
- Identifying signs of fentanyl exposure in animals is challenging as many are non-specific eg excitement, pacing, panting
- Police sniffer dogs are at risk of fentanyl exposure and in some forces dog handlers are trained in the administration of naloxone

### STATEMENT (CONCLUSIONS)

Veterinary surgeons should ask about fentanyl exposure in pets where there are concerns re symptoms.

# Poster presentations

## Maintaining compassion and preventing compassion fatigue

Fiona Finlay<sup>1</sup>, Anna Baverstock<sup>2</sup>

1 Virgin Care, Bath, United Kingdom

2 Musgrove Park Hospital, Taunton, United Kingdom

### OBJECTIVES

Compassion may be defined as a deep awareness of the suffering of another human or animal, coupled with the wish to relieve it. To enable vets to continue to provide compassionate they need to look after themselves and those in their team.

Using the analogy of the charge in a mobile phone battery, on some days you do not use it much and your battery strength is good, whereas on other days, there is a bigger drain on reserves, and your battery needs recharging. If there is no chance to recharge, over time, compassion fatigue and burnout may occur. We aim to help you recognise signs of compassion fatigue, and look at 'drainers' and 'chargers' from both an individual and a team perspective.

### METHODS

A review of the literature coupled with examples from our experience as paediatricians.

### RESULTS

#### Individual drainers

- Complaints
- Discrimination

- Colleague sickness
- Long hours
- Intra-operative death
- Busy on-call

#### Individual chargers

- CPD
- Reflection
- Coaching
- Mentoring
- Supervision
- Exercise, cinema, reading, music

#### Team drainers

- Recruitment problems
- Bullying
- Unrealistic targets
- Financial difficulties
- Practice take-over
- Poorly functioning team

#### Team chargers

- Debriefing after stressful events
- Regular breaks
- Peer support
- Teaching sessions
- 'Away-days'

### STATEMENT (CONCLUSIONS)

We need to think about how we recharge through the day to ensure compassionate, high quality care from the beginning of our shift to the end. We need to become more aware of our own reserves, identifying individual and team 'drainers' thereby allowing us to implement 're-charging' strategies to try to prevent compassion fatigue and burnout.

## Section VII

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# Appendix: answers to multiple choice questions

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# Appendix: answers to multiple choice questions

## VETERINARY

### Thursday 4 April

#### MY TOP TIPS IN...

Neurology 1=D, 2=B, 3=B  
Oncology 1=A, 2=A, 3=C  
Reproduction 1=D, 2=A, 3=A  
Soft tissue surgery 1=D, 2=C, 3=B  
Cardiology 1=C, 2=D, 3=A  
Orthopaedic surgery 1=D, 2=C, 3=A

#### SURGICAL COMPLICATIONS

My wound broke down: what now? 1=C, 2=C, 3=D  
My enterotomy is leaking: what now? 1=B, 2=C, 3=A  
Having difficult conversations 1=B, 2=A, 3=B  
Something is bleeding: what now? 1=A, 2=D, 3=C  
I didn't get surgical margins: what now? 1=B, 2=A, 3=B  
I left a urolith behind: what now? 1=B, 2=C, 3=B

#### ONCOLOGY

Paraneoplastic syndromes 1=B, 2=C, 3=A  
Biopsies: getting good results 1=B, 2=D, 3=D  
Pathology reports: what a clinician needs to know 1=B, 2=C, 3=C  
Is advanced imaging always better? 1=D, 2=A, 3=C  
Planning oncological surgery 1=C, 2=D, 3=B  
Chemotherapy: the basics 1=D, 2=C, 3=D  
Oncology treatments: new and on the horizon 1=D, 2=B, 3=C

#### EXOTICS

Updates on rabbit medicine & surgery 1=D, 2=A, 3=B  
Sedation, analgesia and anaesthesia in small mammals 1=C, 2=B, 3=C  
Managing chelonian shell disorders 1=C, 2=B, 3=C  
Avian clinical techniques 1=D, 2=B, 3=C  
Clinical applications of rabbit endoscopy 1=D, 2=B, 3=B  
Clinical applications of reptile endoscopy 1=A, 2=D, 3=A  
Top tips for ferret surgery 1=C, 2=B, 3=D  
Reptile diagnostic imaging 1=B, 2=A, 3=D

#### DERMATOPHYTOSIS

Dermatophytosis casebook: common impersonators and atypical presentations 1=A, 2=B, 3=B  
Is it a false positive? Current recommendations for diagnosis of dermatophytosis 1=D, 2=B, 3=A  
Managing multiples: dermatophytosis disease outbreaks 1=D, 2=A, 3=B

### Friday 5 April

#### OPHTHALMOLOGY

The cracked or dirty windshield: disorders of the ocular surface 1=B, 2=D, 3=D  
The 'bulging eye': how do I know; how do I treat? 1=D, 2=C, 3=D  
Glaucoma: understanding & treating a leading, and painful cause of blindness 1=A, 2=B, 3=D  
Ophthalmic manifestations of endocrinopathies 1=D, 2=A, 3=D  
Masquerading eye disease: when one disease looks like another 1=B, 2=D, 3=D  
Cataract: what can I do about it? 1=B, 2=D, 3=C  
Will my dog see again? Examination, assessment and differential diagnosis of the blind patient 1=A, 2=C, 3=B

#### HAEMATOLOGY

Approach to anaemia 1=B, 2=B, 3=C  
Transfusion medicine 1=B, 2=C, 3=A  
Management of IMHA 1=C, 2=A, 3=A  
Approach to the suspected coagulopathic patient 1=D, 2=A, 3=C  
Management of thrombocytopenia 1=A, 2=B, 3=C  
Investigation of polycythaemia 1=A, 2=C, 3=D  
Investigation of leucopenia 1=D, 2=C, 3=A  
Haemolytic anaemia: when is it not IMHA? 1=C, 2=A, 3=C

#### BOURGELAT

Imaging the adrenals 1=A, 2=B, 3=C  
Atypical hypoadrenocorticism 1=B, 2=A, 3=D  
Diagnosis of canine hyperadrenocorticism. Is it always straightforward? 1=B, 2=C, 3=B  
Monitoring treatment in canine hyperadrenocorticism 1=A, 2=C, 3=B

#### AVP

Management of intraoperative hypotension 1=B, 2=C, 3=A  
Infection control for the surgical patient. 1=C, 2=C, 3=D  
Options for the treatment of combined cranial cruciate ligament insufficiency and medial patellar luxation 1=D, 2=B, 3=C

#### CT

I want a CT scanner: considerations prior to purchase 1=C, 2=C, 3=C  
I have a CT scanner: what now? 1=D, 2=C, 3=B  
How to look at a CT scan: a beginner's guide 1=D, 2=C, 3=D  
Breathe in: thoracic CT 1=D, 2=A, 3=C  
Around the abdomen: indications for abdominal CT 1=A, 2=C, 3=D  
A headache or a pain in the neck? Head and Neck CT 1=C, 2=D, 3=C  
Give the dog a bone; orthopaedic CT 1=C, 2=B, 3=A  
Could I, Should I, Would I? When can I use spinal CT? 1=C, 2=B, 3=C

### Saturday 6 April

#### FANTASTIC FOREIGN BODIES AND HOW TO FIND THEM!

Tracking foreign bodies: a review of imaging techniques 1=C, 2=D, 3=D  
Foreign bodies of the head 1=B, 2=B, 3=C  
Endoscopic management of foreign bodies 1=D, 2=B, 3=B  
'For the chop': surgical management of thoracic and abdominal foreign bodies 1=D, 2=C, 3=A  
Needle in a haystack: dealing with tracking foreign bodies 1=C, 2=C, 3=A  
The recurrent foreign body: what to do next? 1=D, 2=C, 3=D

#### NEUROLOGY

How to get the most from your neuro exam 1=B, 2=C, 3=A  
Cerebrovascular disease: do dogs have strokes? 1=C, 2=C, 3=C  
Poorly puppies: neurological disease in the young animal 1=D, 2=B, 3=A  
Cervical spondylomyelopathy ('Wobblers'): diagnosis and treatment options 1=C, 2=B, 3=A  
Spinal cord disorders on a budget 1=B, 2=D, 3=B  
Cranial nerve disorders: figuring out the floppy faces 1=A, 2=D, 3=D  
A logical approach to vestibular disease 1=B, 2=C, 3=A

#### CARDIORESPIRATORY

Approach to the young coughing dog 1=B, 2=D, 3=D  
Older dog with a cough: is it cardiac or respiratory? Top tips on how to tell 1=A, 2=C, 3=D  
Approach to pulmonary hypertension 1=A, 2=C, 3=B  
How I perform a bronchoscopy 1=B, 2=C, 3=D  
Thoracic imaging picture quiz: is it cardiac or is it respiratory? 1=A, 2=C, 3=D  
The punctured pet: dealing with thoracic bite wounds/stick injuries 1=A, 2=D, 3=C  
Top tips on chest drain placement 1=B, 2=C, 3=A  
Top tips on thoracic cytology 1=C, 2=B, 3=D  
Diagnosis and medical management of pyothorax 1=D, 2=D, 3=D  
Diagnosis and surgical management of pyothorax 1=C, 2=C, 3=A

#### SHELTER MEDICINE

A pragmatic approach to dog diarrhoea in the shelter environment 1=D, 2=B, 3=B  
Prepubertal neutering: a pragmatic approach 1=C, 2=D, 3=B  
A pragmatic approach to the skinny old cat in the shelter environment 1=A, 2=D, 3=A

#### AVP

Ophthalmological manifestation of systemic disease 1=C, 2=A, 3=D  
Cardiac manifestation of systemic disease 1=B, 2=C, 3=A  
Management of refractory epilepsy 1=D, 2=D, 3=B  
Acute kidney injury: practical management 1=C, 2=C, 3=B

## IMAGING

Is this a bone tumour? Differentiating benign and malignant bone disease with radiographs 1=C, 2=C, 3=A

A waste of time? Should we still be doing skull radiographs in 2019? 1=B, 2=B, 3=C

Is this elbow dysplasia? What radiographs tell us and when to use CT 1=D, 2=B, 3=B

From head to tail, imaging the neurological patient: when are radiographs still useful? 1=D, 2=B, 3=C

Now, your turn: interactive orthopaedic film reading 1=C, 2=B, 3=A

Now, your turn: interactive head and neck film reading 1=B, 2=C, 3=A

Orthopaedic weird and wonderful: an interactive radiographic journey 1=A, 2=C, 3=A

Now, your turn: interactive spine film reading 1=D, 2=B, 3=D

## LOCO-REGIONAL ANAESTHESIA STREAM

Basic LA plus pharmacology 1=A, 2=A, 3=B

LA equipment 1=D, 2=C, 3=C

Local block in the head 1=A, 2=D, 3=B

Thoracic limb LA techniques 1=D, 2=A, 3=B

Epidural anaesthesia 1=A, 2=D, 3=B

Pelvic limb LA techniques 1=B, 2=A, 3=C

Abdominal/thoracic LA techniques 1=D, 2=B, 3=A

LA and analgesia cases: interactive stream 1=A, 2=D, 3=C

## Sunday 7 April

### CARDIOLOGY

Cardiac therapeutics: atrioventricular valve disease 1=A, 2=D, 3=A

Cardiac therapeutics: feline cardiology 1=B, 2=D, 3=B

Cardiac therapeutics: dilated cardiomyopathy 1=A, 2=D, 3=D

Cardiac therapeutics: medical treatment of arrhythmias (in dogs with DCM) 1=A, 2=C, 3=D

Challenging cases: approach to the patient with cardiac disease and renal dysfunction 1=C, 2=D, 3=B

Challenging cases: approach to the cardiac patient with concurrent respiratory disease 1=A, 2=B, 3=D

Cardiac therapeutics: pericardial disease 1=D, 2=C, 3=C

### IMMUNOLOGY

Understanding immunological testing 1=A, 2=B, 3=C

Immune-mediated skin disease 1=B, 2=A, 3=A

Novel immunotherapy 1=B, 2=A, 3=B

Glomerulonephritis 1=B, 2=C, 3=A

How to: collect CSF samples 1=C, 2=C, 3=B

How to: perform joint taps 1=C, 2=C, 3=B

Stiff painful and pyrexia: an interview with a medic, neurologist & orthopaed 1=D, 2=B, 3=B

## NURSING

### Thursday 4 April

#### VN – OPHTHALMOLOGY

Common eye conditions: medical and surgical 1=C, 2=A, 3=C

Surgical preparation and instrumentation for ophthalmic patients 1=B, 2=C, 3=A

Post-op nursing considerations for ophthalmic patients 1=B, 2=A, 3=C

#### VN – NEUROLOGY

Nursing the brain injury patient 1=D, 2=B, 3=A

Nursing and rehabilitating patients with neuromuscular disease 1=B, 2=D, 3=C

Rehabilitation post spinal surgery 1=B, 2=C, 3=A

#### VN – CONSULTATIONS

Surgical nursing clinics 1=C, 2=D, 3=A

How to implement running a clinic 1=D, 2=D, 3=D

How to do more clinics 1=C, 2=D, 3=C

Communication skills for consulting nurses 1=B, 2=C, 3=D

Medical clinics: what can we be doing? 1=C, 2=A, 3=D

#### VN – GENERAL NURSING

Infection control: a challenge for the whole team 1=A, 2=D, 3=D

Lungworm: should we be worried? 1=A, 2=B, 3=C

Nursing and treatment options for the hyperthyroid cat 1=B, 2=C, 3=A

Ill communication: effective team handovers 1=A, 2=D, 3=B

## Friday 5 April

#### VN – ECC

Nursing the trauma patient 1=A, 2=A, 3=C

Nutrition myths in critical patients 1=A, 2=B, 3=C

Common toxins in dogs 1=D, 2=A, 3=B

Bleeding nightmares 1=C, 2=A, 3=A

How to manage a chest drain 1=A, 2=A, 3=B

How to place nasal oxygen catheters 1=C, 2=C, 3=B

Nursing the septic abdomen patient 1=A, 2=B, 3=B

Dying to pee: nursing the blocked cat 1=D, 2=B, 3=A

Managing the dyspnoeic patient 1=A, 2=D, 3=B

#### VN – SURGICAL

Caesareans 1=C, 2=A, 3=A

The VN'S role during acute surgical haemorrhage 1=D, 2=C, 3=C

Does what we wear in the theatre impact patient safety? 1=B, 2=D, 3=D

Thoracic wall trauma 1=C, 2=C, 3=B

Pre-op surgical site infection prevention 1=D, 2=C, 3=C

How to reduce post-op HAI 1=A, 2=D, 3=D

Difficult skin closures: what options do we have? 1=B, 2=D, 3=D

Loco-regional blocks 1=B, 2=D, 3=A

Rehabilitation of orthopaedic patients 1=A, 2=B, 3=C

#### VN – BEHAVIOUR, WELFARE & ETHICS

Dog bite prevention 1=C, 2=B, 3=D

Street dog health and behaviour 1=C, 2=B, 3=C

Good Intentions & good welfare outcomes 1=D, 2=C, 3=A

Positive patient welfare: what the RVN can do 1=A, 2=D, 3=B

Breed-specific legislation 1=C, 2=D, 3=C

Geriatric welfare 1=D, 2=A, 3=C

Welfare conundrums 1=C, 2=A, 3=B

Acute pain and its welfare implications 1=D, 2=A, 3=C

## Saturday 6 April

#### VN – ONCOLOGY

Common cancers and paraneoplastic syndromes 1=A, 2=C, 3=D

Oncology emergencies 1=D, 2=B, 3=D

Staging the oncology patient 1=C, 2=C, 3=D

Radiotherapy 1=B, 2=D, 3=B

Chemotherapy: administration and adverse effects 1=A, 2=D, 3=B

Palliative care for cancer patients 1=B, 2=D, 3=B

Novel treatments: what's new and advances 1=A, 2=B, 3=D

Client support for patients with terminal illness 1=A, 2=D, 3=C

#### VN – MEDICINE

IBD 1=D, 2=B, 3=C

Diabetes mellitus: let's not sugar coat it! 1=A, 2=B, 3=C

Feline diabetes: they are not small diabetic dogs 1=A, 2=B, 3=C

DKA 1=D, 2=D, 3=B

Haematology: Blood transfusions, products and monitoring 1=C, 2=D, 3=B

Haematology: Common bleeding disorders 1=D, 2=C, 3=A

Endocrinology: Feline hyperthyroidism 1=D, 2=C, 3=C

Endocrinology: Hyperadrenocorticism and hypoadrenocorticism 1=D, 2=C, 3=D

#### VN – ANAESTHESIA

The pre-anaesthetic exam 1=A, 2=D, 3=B

Anaesthesia of the head trauma patient 1=A, 2=C, 3=B

# Appendix: answers to multiple choice questions

Anaesthesia of the RTA cat 1=B, 2=A, 3=A  
Anaesthesia of the brachycephalic patient 1=A, 2=D, 3=C  
Anaesthesia of the young and old 1=D, 2=B, 3=D  
Anaesthesia for the acute abdomen 1=A, 2=A, 3=A  
Central lines 1=A, 2=A, 3=A  
Arterial Lines 1=A, 2=B, 3=A  
Anaesthesia and analgesia of patients with complex medical conditions 1=B, 2=D, 3=A

## Sunday 7 April

### VN – EXOTICS

Help: Rabbit anaesthetic. 1=B, 2=C, 3=A  
Preventative medicine for rabbits 1=B, 2=D, 3=C  
Rabbit obesity clinics 1=C, 2=D, 3=A  
Nursing ileus 1=A, 2=C, 3=A  
Is it all about hay and grass: rabbit nutrition 1=B, 2=A, 3=D

### VN – NURSING LEADERSHIP AND MANAGEMENT STREAM

Leadership: what are the benefits for RVNs 1=B, 2=C, 3=B  
Challenges of the head nurse and how to lead your team effectively 1=D, 2=C, 3=C  
Leadership skills for all roles 1=D, 2=B, 3=D  
Managing your team through a change 1=A, 2=C, 3=B  
Swapping between leadership and management: multi-tasking nurses! 1=B, 2=A, 3=A  
A simple approach to development reviews 1=C, 2=A, 3=B

### VN – NUTRITION

Making and Implementing a nutritional assessment 1=B, 2=B, 3=D  
Compliance for nutritional recommendations 1=B, 2=B, 3=D  
Feeding the renal patient 1=A, 2=C, 3=D  
Nutritional management of the hyperthyroid cat 1=B, 2=C, 3=D  
Nutritional Management of Gastrointestinal Disease I 1=C, 2=D, 3=B  
Nutritional Management of Gastrointestinal Disease II 1=B, 2=D, 3=A

## MANAGEMENT

### Thursday 4 April

#### NEW TO BUSINESS LEADERSHIP

Leadership: the art of managing uncertainty in veterinary practice 1=D, 2=D, 3=C  
Acquiring the 'right' to lead: the difference between knowledge and self-belief 1=B, 2=D, 3=D  
Leadership and culture: two sides of the same coin 1=D, 2=B, 3=A  
Leading your sub-team managers 1=A, 2=D, 3=A  
Setting up from scratch 1=D, 2=A, 3=D  
So you're now a Clinical Director. Help! 1=D, 2=A, 3=B

### Friday 5 April

#### NEW TO MANAGEMENT

Internal marketing 1=D, 2=D, 3=D  
External marketing 1=C, 2=A, 3=D  
Understanding the financial basics 1=C, 2=A, 3=D  
How practice finances work 1=B, 2=D, 3=B  
Team development 1=C, 2=B, 3=D  
Getting the best out of clinical workflow 1=D, 2=A, 3=C  
Crisis, what crisis? 1=C, 2=D, 3=A

### Saturday 6 April

#### KEY SKILL FOCUS: EFFECTIVE COMMUNICATION

You're different from me: four communication styles 1=D, 2=A, 3=D  
Meetings, meetings: make them work 1=A, 2=D, 3=C  
When they say 'No': managing expectations 1=D, 2=C, 3=B  
Could do better: managing high performers 1=D, 2=C, 3=B

All together now: creating team dynamics 1=A, 2=C, 3=B  
Five signs of a high performance teams 1=C, 2=D, 3=C  
Yes, please: improving client compliance 1=B, 2=D, 3=B  
Difficult client or difficult communication? 1=C, 2=A, 3=D

### Sunday 7 April

#### MANAGEMENT

Top 5 ways vets get sued & how to avoid them as a recent graduate. 1=D, 2=D, 3=D  
Putting you first: how to manage body and mind to avoid burnout, depression and other negatives 1=C, 2=D, 3=D  
Personal branding for vets: why you need one and how to become the local pet celebrity. 1=D, 2=D, 3=A

### OPEN TO ALL

### Thursday 4 April

#### OBESITY

The principles of weight management: using scientific evidence to maximise success 1=C, 2=C, 3=B  
The practicalities of weight management: making it work in your practice 1=B, 2=D, 3=D  
Tackling the obese patient with concurrent disease: what are your priorities? 1=A, 2=D, 3=C  
Can obesity be prevented? 1=B, 2=A, 3=C

#### REPRODUCTION

Hormonal testing 1=A, 2=D, 3=C  
Managing the pregnant bitch 1=C, 2=A, 3=A  
Managing parturition: when do I reach for the scalpel? 1=A, 2=C, 3=A  
First 48 hours 1=B, 2=A, 3=B

#### DEALING WITH MULTI-DRUG RESISTANT STAPHYLOCOCCAL INFECTIONS

The lab report says MRSP: what do I need to know? 1=A, 2=B, 3=A  
Tough choices: treatment options for MRSP pyoderma 1=B, 2=B, 3=D  
Top hygiene tips for dealing with multi-drug resistant skin pathogens in practice 1=B, 2=C, 3=C

### Friday 5 April

#### CLINICAL PATHOLOGY ON A BUDGET

Getting more for no more from your laboratory 1=D, 2=B, 3=B  
Cytology: fine-needle aspirate techniques and solid lumps 1=B, 2=A, 3=D  
Cytology: don't forget the blood smear 1=C, 2=C, 3=A  
Cytology: fluids 1=A, 2=D, 3=A  
When to test and when to treat 1=A, 2=D, 3=B  
Point-of-care meters 1=B, 2=C, 3=D

#### CLINICAL PATHOLOGY REFRESHER EXOTICS

Small Mammals 1=A, 2=B, 3=C  
Reptiles and Birds 1=C, 2=C, 3=A

#### DENTISTRY

Odontogenic tumours 1=B, 2=C, 3=D  
Jaw opening and closing disorders 1=A, 2=C, 3=C  
Flap techniques in palatal surgery 1=D, 2=A, 3=C  
Mandibular fracture repair considerations 1=A, 2=B, 3=B  
Oral masses in cats: inflammatory or neoplastic 1=C, 2=D, 3=D  
Feline chronic stomatitis: a frustrating and debilitating disease 1=C, 2=D, 3=A  
Periodontal therapy 1=C, 2=A, 3=B  
Feline extraction techniques 1=C, 2=B, 3=B

#### RECENT GRADUATES

Tooth extraction 1=A, 2=A, 3=B  
Pale, bruised, bleeding: what's going on? 1=C, 2=A, 3=D

Is this murmur significant? 1=B, 2=A, 3=C  
How to manage cases that aren't going well 1=D, 2=A, 3=B

### RCVS KNOWLEDGE

How good are you and can you prove it? 1=C, 2=B, 3=A  
How to apply best evidence to manage and care for epilepsy patients in daily clinical practice 1=D, 2=C, 3=C  
Research into small animal practice: why evidence matters 1=C, 2=D, 3=B  
Learning from a rabbit anaesthetic death, evidence-based approach to rabbit anaesthesia in practice 1=C, 2=D, 3=B  
First do no harm: how systems can reduce the rate of morbidity and mortality by 50% 1=D, 2=B, 3=C  
Reliable care in the NHS: building safer systems in a just culture 1=C, 2=C, 3=C

## Saturday 6 April

### CRITICAL CARE

Basic introduction to the use of blood gases 1=B, 2=C, 3=A  
Advanced blood gas analysis 1=D, 2=B, 3=C  
Techniques for oxygen therapy 1=B, 2=A, 3=C  
Nutrition in critical care 1=C, 2=C, 3=A  
Approach to DKA 1=B, 2=D, 3=A  
Emergency management of urethral obstruction 1=A, 2=D, 3=A  
Acute kidney injury 1=C, 2=A, 3=B  
Management of canine acute pancreatitis 1=B, 2=C, 3=C

## Sunday 7 April

### MY PRAGMATIC APPROACH TO...

PU/PD 1=C, 2=D, 3A  
Hypercalcaemia 1=A, 2=D, 3=C

Juvenile lameness 1=D, 2=A, 3=B  
Seizures 1=A, 2=D, 3=C  
Prescription foods 1=C, 2=B, 3=B  
Pruritic skin disease 1=B, 2=D, 3=A  
Chronic diarrhoea 1=C, 2=B, 3=D

### ORTHOPAEDICS

FL lameness in cats: sources and solutions 1=B, 2=D, 3=A  
HL lameness in cats: sources and solution 1=B, 2=A, 3=C  
Feline OA: diagnosis and management 1=D, 2=B, 3=C  
Coronoid disease in dogs: where are we now? 1=C, 2=D, 3=A  
Humeral intercondylar fissures in dogs 1=A, 2=B, 3=B  
Ununited anconeal process: what to do? 1=C, 2=D, 3=D  
Elbow incongruence: what to do when 1=B, 2=C, 3=A

### SAFETY STREAM

Pre-op safety and preparation: what really helps and do pre-op bloods improve outcome? 1=B, 2=C, 3=A  
How equipment harms patients 1=B, 2=A, 3=A  
How to use checklists to improve safety (and how not to) 1=A, 2=A, 3=A  
What anaesthetic monitoring really helps? 1=A, 2=A, 3=D  
Clinical Audit: how to set up 1=B, 2=C, 3=D  
An anaesthetist's day from hell: interactive cases 1=D, 2=D, 3=D  
M and M rounds 1=A, 2=D, 3=B

### VDS TRAINING

Taking time out to get time back 1=A, 2=B, 3=D  
The three Ps for having a good day: present, proactive and positive 1=D, 2=A, 3=C  
Leaning into colleagues, clients and cases 1=A, 2=A, 3=A  
Stepping up and speaking out 1=A, 2=A, 3=A





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